

# UNCLASSIFIED

AD NUMBER
AD890349
NEW LIMITATION CHANGE
TO Approved for public release, distribution unlimited
FROM Distribution authorized to U.S. Gov't. agencies only; Test and Evaluation; NOV 1971. Other requests shall be referred to Commander, Naval Weapons Lab., Dahlgren, VA 22448.
AUTHORITY
USNSWC ltr, 11 Sep 1975

THIS PAGE IS UNCLASSIFIED

D215-14:

2643

Ad 890349

# SALVO KILL PROBABILITIES FOR CIRCULAR TARGETS - AXISYMMETRIC CASE

Marlin A. Thomas

1-1-71

11-8-71

U.S. NAVAL ACADEMY

20070122 086

U. S. NAVAL WEAPONS LABORATORY  
DAHLGREN, VIRGINIA



NWL TECHNICAL REPORT TR-2643  
November 1971

SALVO KILL PROBABILITIES  
FOR CIRCULAR TARGETS - AXISYMMETRIC CASE

by

Marlin A. Thomas  
Warfare Analysis Department

Distribution limited to U. S. Government  
agencies; test and evaluation; November  
1971. Other requests for this publication  
must be referred to the Naval Weapons  
Laboratory, Dahlgren, Virginia 22448.

## FOREWORD

The work covered in this Technical Report was performed in the Mathematical Statistics and Systems Simulation Branch (KCM) of the Operations Research Division, Warfare Analysis Department. The date of completion was 05 November 1971.

The axisymmetric kill probability formulation reported here was programmed by Ms. Carlton Rowe, and the program editing for the table was performed by Ms. Nancy Staton. This assistance is acknowledged with appreciation. The author also wishes to acknowledge the original axisymmetric kill probability formulation of Dr. Milton P. Jarnagin, and to express appreciation to Dr. Jarnagin for the many fruitful discussions which led to the current AKP program and the table contained herein. This report was reviewed by Mr. Carl M. Hynden, Jr.

Released by:



R. I. ROSSBACHER  
Head, Warfare Analysis Department

## ABSTRACT

The kill probability resulting from the delivery of a salvo of weapons is not a straightforward calculation since the aiming error is likely to be common to all rounds in the salvo. In the absence of a computer program or a set of tables the analyst may have to resort to the binomial law  $1-(1-p)^N$ , where  $p$ , the "single shot kill probability" is computed on the assumption that both aiming error and round-to-round error vary with each round in the salvo. Use of the binomial law in the salvo case can introduce serious error.

As an aid in determining weapon requirements, comparing weapon systems effectiveness, etc., salvo kill probabilities against circular targets are tabulated for a wide variety of parametric values under the following assumptions: (1) one aims at the center of a target of radius  $a$  and fires a salvo of size  $N$ ; (2) the error in the mean impact point of the salvo from the target center is governed by a circular normal density with variance  $\sigma_1^2$ ; (3) the mean impact point is common to all rounds in the salvo but varies from salvo to salvo; (4) the errors in the individual impact point of shots within a salvo from the mean impact point are independently governed by a circular normal density with variance  $\sigma_2^2$ ; (5) the two errors above, referred to as the aiming error and the round-to-round error, respectively, are independent. The salvo kill probability, i.e., the probability that at least one round in the salvo falls within the target, is computed as a function of  $R = a/\sigma_2$ ,  $T = \sigma_1/\sigma_2$ , and  $N$  for  $R = .1(.1)3.0(.2)5.0$ ,  $T = .1(.1)3.0(.2)5.0$  and  $N = 1(1)14(2)20$ . Various examples pertaining to the use of the tables are given.

## CONTENTS

	Page
FOREWORD-----	i
ABSTRACT-----	ii
I. INTRODUCTION-----	1
II. DISCUSSION-----	2
III. COMPUTATION-----	6
IV. DESCRIPTION OF TABLE-----	8
V. CONCLUSION-----	10
REFERENCES-----	12

### APPENDICES

- A - Table of  $A(R,T,N)$
- B - AKP Program Listing
- C - Distribution

## I. INTRODUCTION

Suppose one has a circular target of radius  $a$  with center at the origin of the Cartesian coordinate system. Suppose further that a salvo of  $N$  shots is fired at the target and that the mean impact point of the salvo is a random point from a circular normal distribution with mean at the origin and variance  $\sigma_1^2$ . Also assume that the impact points of the  $N$  shots or rounds in the salvo are independent points from a circular normal distribution with mean equal to the mean impact point of the salvo and variance  $\sigma_2^2$ . The problem is that of finding the probability that at least one shot or round in the salvo hits the target, i.e., lies within the target radius. Because of the circular symmetry with respect to the origin, the problem has recently been coined the "axisymmetric" problem by Jarnagin, reference [1], and thus the computed probabilities are referred to as axisymmetric kill probabilities.

A typical salvo configuration is shown in Figure 1 for  $N = 6$  where the circular dot represents the mean impact point (drawn from a circular normal distribution with mean vector  $\underline{0}$  and variance  $\sigma_1^2$ ) and the crosses represent the individual round impact points (drawn independently from a circular normal distribution with mean equal to the mean impact point and variance  $\sigma_2^2$ ). The key feature in this formulation is that it allows for error in the mean impact point of the salvo (governed by  $\sigma_1$ ) as well as round-to-round error about the mean (governed by  $\sigma_2$ ). The former error is sometimes referred to as the "aiming" error and is common to all rounds in the salvo. For a particular salvo, it results in a definite bias in some direction and of some magnitude, but the direction and magnitude of this error vary from salvo to salvo. For example, if a salvo is fired at map coordinates from a naval vessel, this error could be due to navigational and/or geodetic inaccuracies. The latter error, assumed independent of the first, is sometimes referred to as the "round-to-round" or "random" error as it varies from round to round within the salvo. For example, it could be due to ballistic characteristics peculiar to individual rounds.

The solution to the axisymmetric problem has been given by Jarnagin, reference [1], and the purpose of this report is (1) to briefly discuss Jarnagin's solution with respect to normalization of the parameters involved in nondimensional units and (2) to set forth an extensive tabulation of axisymmetric kill probabilities. While, to the best of this author's knowledge, this is the first table of this kind to be published for circular targets, a table of salvo

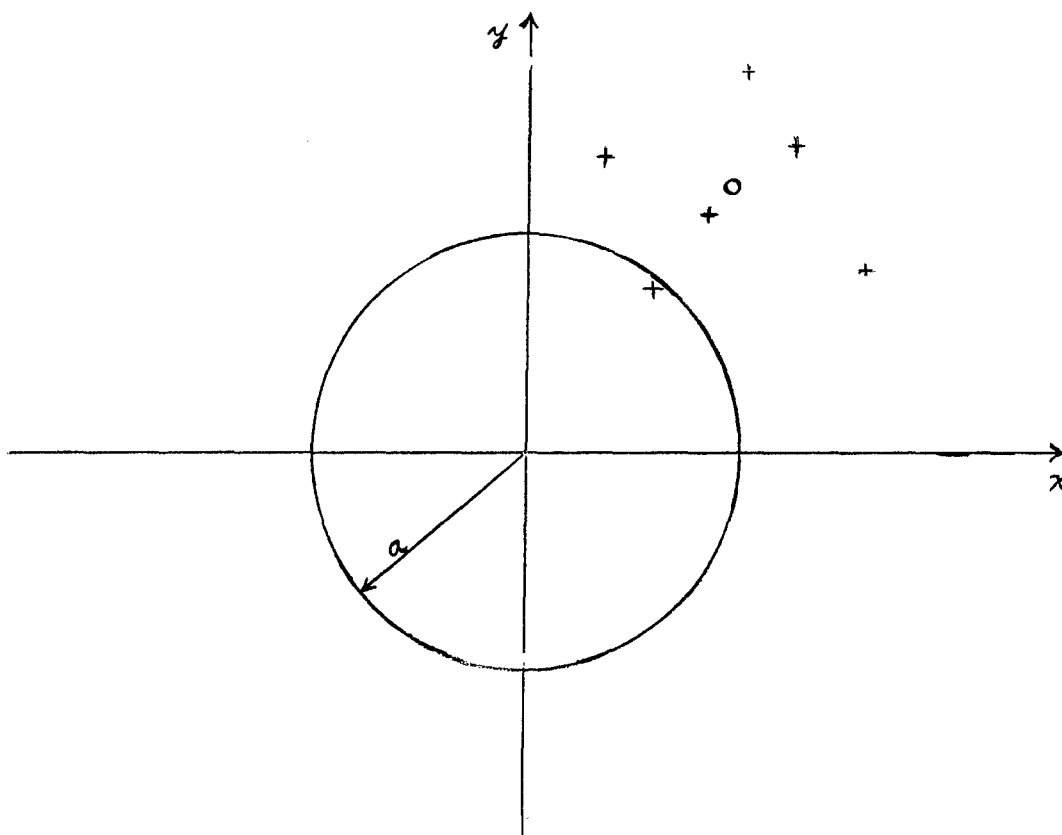


Figure 1.

kill probabilities for square targets was published in 1954 by the National Bureau of Standards, reference [2]. The axisymmetric case under discussion is more realistic for a nuclear attack against hard sites where a "circular target" is synonymous with an assumed "circular weapons effectiveness," and the target is simply a point.

## II. DISCUSSION

Jarnagin's formulation of the expression for the axisymmetric kill probability is given in detail in reference [1]. However, due to its brevity and for the sake of completeness in this report, it will be repeated below. Letting the circular target have a radius  $a$  and be centered at the Cartesian origin, consider a small element of area  $dx dy$  in the real plane. Under the circular normal assumption given in the introduction, the probability that the mean impact point of the salvo is somewhere in this element of area is



$$\frac{1}{2\pi\sigma_1^2} e^{-(x^2+y^2)/(2\sigma_1^2)} dx dy \quad (1)$$

or in polar coordinates is

$$\frac{1}{2\pi\sigma_1^2} e^{-r^2/(2\sigma_1^2)} r dr d\theta \quad (2)$$

Given that the mean impact point of the salvo is in the given element  $dx dy$ , the probability that a particular shot hits the target is simply  $P(a/\sigma_2, r/\sigma_2)$  where  $P(R, d)$  represents the well known circular coverage function which is the integral of a circular normal distribution of unit standard deviation over a circle of radius  $R$  offset from the origin by a distance  $d$ . A discussion of this function and an efficient program for its computation are given by DiDonato and Jarnagin in reference [3]. The conditional probability (conditional on the mean impact point) that a particular shot misses the target is then  $1-P(a/\sigma_2, r/\sigma_2)$ , and the conditional probability that all  $N$  shots in the salvo miss the target is

$$[1-P(a/\sigma_2, r/\sigma_2)]^N \quad (3)$$

due to the assumed independence of the shots within the salvo. Hence, the probability that the mean impact point of the salvo is in the element of area  $dx dy$  and that all  $N$  shots in the salvo miss the target is

$$[1-P(a/\sigma_2, r/\sigma_2)]^N \frac{r}{2\pi\sigma_1^2} e^{-r^2/(2\sigma_1^2)} dr d\theta. \quad (4)$$

Since the mean impact point of the salvo can be anywhere in the plane, the probability that all  $N$  shots miss the target, regardless of the position of the mean impact point of the salvo, is given by integrating this expression over the entire plane, i.e.,

$$\frac{1}{2\pi\sigma_1^2} \int_{\theta=0}^{2\pi} \int_{r=0}^{\infty} [1-P(a/\sigma_2, r/\sigma_2)]^N e^{-r^2/(2\sigma_1^2)} r dr d\theta. \quad (5)$$

The probability A that the target is hit by at least one of the N shots in the salvo is clearly one minus the expression in (5) or

$$A = 1 - \frac{1}{2\pi\sigma_1^2} \int_0^{2\pi} \int_0^{\infty} [1-P(a/\sigma_2, r/\sigma_2)]^N e^{-r^2/(2\sigma_1^2)} r dr d\theta. \quad (6)$$

Since the integrand in (6) is independent of  $\theta$ , one can integrate with respect to  $\theta$  and obtain the result

$$A = 1 - \frac{1}{\sigma_1^2} \int_0^{\infty} [1-P(a/\sigma_2, r/\sigma_2)]^N e^{-r^2/(2\sigma_1^2)} r dr. \quad (7)$$

As aforementioned, the above formulation is given in reference [1].

An alternative formulation, leading to the same solution, can be obtained by writing the conditional probability of at least one hit in density form and using the classical probability rules pertaining to conditional, joint, and marginal probability densities. This is accomplished by defining the discrete random variable  $z$  to be the number of times the target receives at least one hit in a salvo of size  $N$ . Clearly,  $z$  can take on only the values 0 or 1, and the conditional density of  $z$ , given a mean impact point  $(r, \theta)$ , can be expressed as

$$f(z|r, \theta) = \{1-[1-P(a/\sigma_2, r/\sigma_2)]^N\}^z \{[1-P(a/\sigma_2, r/\sigma_2)]^N\}^{1-z} \quad (8)$$

for  $z = 0, 1$  ;  $0 < r < \infty$  ;  $0 < \theta < 2\pi$ . One can now obtain the joint density of all three variables, say  $g(z, r, \theta)$ , by multiplying  $f(z|r, \theta)$  by the joint density of  $(r, \theta)$ , say  $h(r, \theta)$ . By assumption,

$$h(r, \theta) = \frac{r}{2\pi\sigma_1^2} e^{-r^2/(2\sigma_1^2)} \quad (9)$$

so that

$$g(z, r, \theta) = f(z|r, \theta)h(r, \theta) \quad (10)$$

for  $z = 0, 1$  ;  $0 < r < \infty$  ;  $0 < \theta < 2\pi$  where  $f(z|r, \theta)$  and  $h(r, \theta)$  are given by (8) and (9), respectively. The marginal density of  $z$ , say  $p(z)$ , can now be found by integrating  $g(z, r, \theta)$  over the entire range of both  $r$  and  $\theta$ , that is

$$p(z) = \int_0^{2\pi} \int_0^{\infty} g(z, r, \theta) dr d\theta \quad (11)$$

However, since only the probability of at least one hit,  $p(1)$ , is of interest, it is found to be

$$\begin{aligned} p(1) &= \int_0^{2\pi} \int_0^{\infty} \{1 - [1 - P(a/\sigma_2, r/\sigma_2)]^N\} \frac{r}{2\pi\sigma_1^2} e^{-r^2/(2\sigma_1^2)} dr d\theta \\ &= 1 - \int_0^{2\pi} \int_0^{\infty} [1 - P(a/\sigma_2, r/\sigma_2)]^N \frac{r}{2\pi\sigma_1^2} e^{-r^2/(2\sigma_1^2)} dr d\theta \end{aligned}$$

$$= 1 - \frac{1}{\sigma_1^2} \int_0^{\infty} [1 - P(a/\sigma_2, r/\sigma_2)]^N e^{-r^2/(2\sigma_1^2)} r dr \quad (12)$$

which is precisely the form of A in equation (7).

Examination of equation (7) (or equivalently (12)) reveals that A is a function of four parameters, namely a,  $\sigma_1$ ,  $\sigma_2$ , and N. Hence, A can be expressed in functional form as  $A(a, \sigma_1, \sigma_2, N)$ . As a function of four parameters, any tabulation of A poses difficulties since to cover a practical range for all parameters would require a very long table indeed. Fortunately, the problem can be circumvented by normalizing the parameters to nondimensional units with the effect of eliminating one of the parameters. It was chosen to normalize with respect to  $\sigma_2$ , and it can be easily shown that

$$A(a, \sigma_1, \sigma_2, N) = A(a/\sigma_2, \sigma_1/\sigma_2, 1, N), \quad (13)$$

that is, that A is a function of only three parameters: the normalized target radius, the normalized  $\sigma_1$ , and N. This is shown by making the transformation  $y = r/\sigma_2$  in (7) and letting  $R = a/\sigma_2$  and  $T = \sigma_1/\sigma_2$  which leads to

$$A = 1 - \frac{1}{T^2} \int_0^{\infty} [1 - P(R, y)]^N e^{-y^2/(2T^2)} y dy \quad (14)$$

which is a function of only R, T, and N. In the tabulation which follows, A in expression (14) will be designated as simply  $A(R, T, N)$ .

### III. COMPUTATION

Unfortunately, the integral in expression (14) cannot be expressed in closed form since  $P(R, y)$  itself is a double integral which cannot be expressed in closed form. However, due to an efficient algorithm devised by DiDonato and Jarnagin for evaluating  $P(R, y)$ , reference [3], the integral in (14) lends itself well to numerical integration. One must

first, however, find a large finite upper limit for the integral which will result in negligible error. This was found by Jarnagin, reference [1], for the integral in equation (7), and his same procedure can be applied to the integral in expression (14). Suppose one integrates from zero to  $cT$  vice zero to  $\infty$ . The resulting error  $E$  is

$$E = \frac{1}{T^2} \int_{cT}^{\infty} [1-P(R,y)]^N e^{-y^2/(2T^2)} y \, dy$$

$$< \frac{1}{T^2} \int_{cT}^{\infty} y e^{-y^2/(2T^2)} \, dy = e^{-c^2/2}$$
(15)

since  $[1-P(R,y)]^N$  is always between zero and one. This is the same result obtained by Jarnagin except his  $c$  was in units of  $\sigma_1$  and the above  $c$  is in units of  $T = \sigma_1/\sigma_2$ . For all computations displayed in this table,  $c$  was taken as 5 which provided an error of less than .00000373.

Using an upper limit of  $5T$  on the integral in (14), the integration was performed on the CDC 6700 digital computer at the Naval Weapons Laboratory using an iterative procedure based on the parabolic (or Simpson's) rule. This requires no elaboration except to say that the interval length was halved in successive iterations, and the integration tolerance was taken as .00001, that is, when the maximum absolute difference between three successive approximations for the integral fell within this tolerance, the iterative procedure was terminated. This tolerance and a  $c=5$  are more than adequate to claim the four decimal place accuracy to which the table entries are printed.

The computer time for the entire table of 27,200 entries was 3172 seconds or an average 117 milliseconds per entry.

#### IV. DESCRIPTION OF TABLE

The table, presented in Appendix A, provides values of  $A(R,T,N)$  for  $R = .1(.1)3.0(.2)5.0$ ,  $T = .1(.1)3.0(.2)5.0$ , and  $N = 1(1)14(2)20$  where  $R = a/\sigma_2$ ,  $T = \sigma_1/\sigma_2$ , and  $N =$  the salvo size. For each value of  $N$ , the first page contains values of  $A$  for all 40 values of  $R$  and values of  $T$  from .1 to 1.4, the second contains values of  $A$  for all 40 values of  $R$  and values of  $T$  from 1.5 to 2.8, and the third contains values of  $A$  for all 40 values of  $R$  and the remaining values of  $T$ . Hence, three pages are required for each value of  $N$  which results in a total of 51 pages. Examples of the use of the table are given below.

##### EXAMPLE 1

Suppose one has a circular target of radius 20 feet, an aiming standard deviation of 100 feet, and a round-to-round standard deviation of 50 feet. Suppose further that a hit on the target provides a kill and that a salvo of size 12 is fired at the target. What is the probability of kill? The probability of kill is simply the probability of at least one hit in a salvo of size 12 and can be found by entering the table with

$$R = a/\sigma_2 = 20/50 = .4$$

$$T = \sigma_1/\sigma_2 = 100/50 = 2$$

$$N = 12$$

One finds  $A(.4,2,12) = .1526$ .

##### EXAMPLE 2

Suppose one has a point target with negligible radius and is firing projectiles with an effectiveness radius of 100 feet. Suppose also that the aiming standard deviation is 200 feet, the round-to-round standard deviation is 50 feet, and the salvo size is 5. What is the probability of kill, i.e., the probability that at least one projectile falls within 100 feet of the target? Here one uses the weapon's effectiveness radius as the target radius and enters the table with

$$R = a/\sigma_2 = 100/50 = 2$$

$$T = \sigma_1/\sigma_2 = 200/50 = 4$$

$$N = 5.$$

One finds  $A(2,4,5) = .2426$ .

### EXAMPLE 3

Suppose one has a point target of negligible radius and is attacking with nuclear warheads with an effectiveness radius of 500 yards. Suppose the aiming CEP,  $CEP_A$ , is 500 yards, the round-to-round CEP,  $CEP_R$ , is 250 yards, and the number of warheads is three. What is the probability of kill? To use the table in this report to answer the above, one must perform several preliminary computations. First, the CEP's must be converted to standard deviations via the relationship  $\sigma = CEP/1.1774$ . Second, in nuclear damage assessment, the round-to-round standard deviation is usually inflated through the relationship

$$\sigma_2 = \sqrt{(CEP_R/1.1774)^2 + (ka)^2}$$

where  $a$  is the weapon effective radius and  $k$  is a parameter reflecting the uncertainty of the weapon effect. The parameter  $k$  is usually assigned a value of .2 or .3, reference [4]. Suppose it is .2 in this example. Then one enters the table with

$$R = a/\sigma_2 = a / \sqrt{(CEP_R/1.1774)^2 + (.2a)^2}$$

$$= 500 / \sqrt{(250/1.1774)^2 + [(.2)(500)]^2}$$

$$= 500/234.70 = 2.13$$

$$T = \sigma_1/\sigma_2 = (CEP_A/1.1774)/234.70$$

$$= (500/1.1774)/234.70 = 1.81$$

$$N = 3.$$

One finds  $A(2.1, 1.9, 3) = .6145$  and  $A(2.2, 1.8, 3) = .6759$  so that the probability of kill lies somewhere between these values. Should one require more information than this, he could find an approximation to  $A(2.13, 1.81, 3)$  by using the tabular values for arguments around  $R = 2.13$  and  $T = 1.81$  in one of the many bivariate interpolation formulas.

#### EXAMPLE 4

Suppose one has a point target with negligible radius and is firing projectiles with an effectiveness radius of 220 feet. If  $\sigma_1 = 210$  feet and  $\sigma_2 = 100$  feet, how large must the salvo be to insure a target kill at the .70 probability level? Here one scans the table for the correct value of  $N$  using

$$R = a/\sigma_2 = 220/100 = 2.2$$

$$T = \sigma_1/\sigma_2 = 210/100 = 2.1$$

One finds  $A(2.2, 2.1, 6) = .6836$  and  $A(2.2, 2.1, 7) = .7033$ . Hence, a salvo of size  $N=7$  would be minimum to insure a target kill at .70 probability level.

#### IV. CONCLUSION

It is hoped that the table contained herein will fill one of the many voids currently existing in weapons systems analysis. The previous nonexistence of tabular salvo kill probabilities for circular targets has resulted in the use of some rather crude approximations by weapons systems analysts. For example, it is not uncommon to see salvo kill probabilities computed (incorrectly) by using a common standard deviation  $\sigma = (\sigma_1^2 + \sigma_2^2)^{1/2}$  in the cumulative radial distribution to obtain

$$p = 1 - e^{-a^2/(2\sigma^2)} \quad (16)$$



The value of  $p$  in (16) is then used as a "single shot kill probability" and applied to the binomial law to obtain a salvo kill probability equal to

$$1 - (1-p)^N. \quad (17)$$

This procedure can result in serious error. For instance, consider EXAMPLE 4 in the last section where it was determined that a salvo of size  $N=7$  was minimum for a target kill at the .70 probability level. Employing the above procedure, one finds  $\sigma^2 = (210)^2 + (100)^2 = 54100$  and

$$\begin{aligned} p &= 1 - e^{-(220)^2 / [2(54100)]} \\ &= .3607. \end{aligned}$$

Setting the expression in (17) equal to .70 with  $p = .3607$  results in  $N=2.7$  or a salvo of size 3! This is a serious departure from the correct value of  $N=7$  - an error of 57% in salvo size.

The above procedure is valid only for the case where  $N=1$ . In fact, it can be shown that  $p$  in (16) is identically equal to  $A(R,T,1)$  so that for this special case, one can express  $A$  in closed form. However, the above procedure is not valid for  $N > 1$ , and one must resort to numerical integration. The reason it is not valid is that in using  $p$  as the so-called "single shot kill probability" in (17) one is assuming that the aiming error as well as the round-to-round error varies for each round in the salvo. This is contrary to the assumption that the aiming error is common to all rounds in the salvo but varies from salvo-to-salvo while the round-to-round error varies from round to round within the salvo.

The selected values of the parameter  $R$ ,  $T$ , and  $N$  for which  $A$  is tabulated should be sufficient for most practical applications. However, should the reader have need of  $A$  for extended values of the parameters or for intermediate values for which interpolation is not adequate a FORTRAN listing of the AKP (Axisymmetric Kill Probability) program is shown in Appendix B. The version shown is not normalized with respect to  $\sigma_2$  so that  $A$  is computed as a function of  $a, \sigma_1, \sigma_2$ , and  $N$  as shown in equation (7).

## REFERENCES

- [1] Jarnagin, Milton P., Jr., 1969. One-Dimensional and Axisymmetric Kill Probability Programs and Approximations. NWL Technical Note TN-K/25-69, U. S. Naval Weapons Laboratory, Dahlgren, Virginia.
- [2] Table of Salvo Kill Probabilities for Square Targets, 1954. National Bureau of Standards, Applied Mathematics Series, Washington, D. C.
- [3] DiDonato, A. R. and Jarnagin, M. P., 1962. A Method for Computing the Generalized Circular Error Function and the Circular Coverage Function. NWL Report No. 1768, U. S. Naval Weapons Laboratory, Dahlgren, Virginia.
- [4] Physical Vulnerability Handbook-Nuclear Weapons (U), 1969. Defense Intelligence Agency, Washington, D. C.

## APPENDIX A

Table of  $A(R,T,N)$

A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 1

R	T	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	1	.0049	.0048	.0046	.0043	.0040	.0037	.0034	.0030	.0028	.0025	.0023	.0021	.0019	.0017
2	2	.0196	.0191	.0182	.0171	.0159	.0146	.0132	.0121	.0110	.0100	.0090	.0082	.0074	.0067
3	3	.0436	.0424	.0404	.0381	.0354	.0326	.0298	.0271	.0246	.0223	.0202	.0183	.0166	.0151
4	4	.0762	.0740	.0708	.0666	.0620	.0571	.0523	.0476	.0432	.0392	.0356	.0323	.0293	.0267
5	5	.1164	.1133	.1084	.1022	.0952	.0878	.0805	.0734	.0667	.0606	.0550	.0499	.0454	.0414
6	6	.1632	.1589	.1522	.1437	.1341	.1240	.1138	.1040	.0947	.0861	.0782	.0711	.0647	.0590
7	7	.2154	.2099	.2013	.1904	.1780	.1649	.1516	.1388	.1266	.1153	.1049	.0955	.0871	.0794
8	8	.2715	.2649	.2544	.2411	.2259	.2097	.1933	.1773	.1621	.1479	.1348	.1229	.1122	.1025
9	9	.3303	.3226	.3103	.2947	.2768	.2575	.2380	.2188	.2005	.1833	.1675	.1529	.1398	.1279
10	10	.3905	.3817	.3679	.3502	.3297	.3076	.2851	.2628	.2414	.2212	.2025	.1853	.1696	.1554
11	11	.4506	.4411	.4260	.4064	.3837	.3591	.3337	.3085	.2841	.2610	.2395	.2196	.2014	.1849
12	12	.5098	.4996	.4834	.4624	.4379	.4111	.3832	.3553	.3282	.3023	.2780	.2555	.2348	.2159
13	13	.5668	.5563	.5394	.5173	.4914	.4628	.4328	.4026	.3730	.3446	.3177	.2927	.2696	.2483
14	14	.6210	.6103	.5931	.5704	.5434	.5135	.4820	.4499	.4181	.3874	.3582	.3308	.3053	.2819
15	15	.6717	.6610	.6437	.6209	.5934	.5627	.5300	.4964	.4629	.4302	.3989	.3694	.3418	.3162
16	16	.7184	.7079	.6910	.6683	.6408	.6098	.5764	.5418	.5070	.4727	.4396	.4082	.3786	.3511
17	17	.7609	.7508	.7344	.7123	.6853	.6544	.6208	.5857	.5499	.5145	.4800	.4469	.4156	.3863
18	18	.7989	.7894	.7738	.7526	.7264	.6961	.6629	.6276	.5914	.5551	.5196	.4852	.4524	.4215
19	19	.8326	.8237	.8091	.7890	.7640	.7348	.7022	.6673	.6311	.5944	.5581	.5228	.4888	.4565
20	20	.8620	.8538	.8404	.8217	.7981	.7702	.7388	.7046	.6688	.6321	.5955	.5594	.5246	.4912
21	21	.8873	.8800	.8677	.8506	.8286	.8024	.7723	.7393	.7043	.6680	.6313	.5949	.5594	.5252
22	22	.9089	.9024	.8914	.8758	.8557	.8313	.8029	.7714	.7374	.7018	.6655	.6291	.5933	.5598
23	23	.9271	.9214	.9117	.8978	.8795	.8570	.8305	.8007	.7681	.7335	.6979	.6618	.6259	.5908
24	24	.9422	.9373	.9288	.9165	.9001	.8797	.8553	.8273	.7963	.7631	.7283	.6928	.6572	.6220
25	25	.9547	.9505	.9431	.9324	.9179	.8995	.8772	.8513	.8221	.7904	.7568	.7222	.6871	.6521
26	26	.9648	.9612	.9550	.9457	.9331	.9167	.8965	.8727	.8455	.8155	.7833	.7497	.7154	.6808
27	27	.9729	.9699	.9647	.9568	.9459	.9314	.9134	.8917	.8665	.8384	.8078	.7755	.7421	.7081
28	28	.9794	.9769	.9726	.9659	.9565	.9440	.9280	.9084	.8853	.8591	.8303	.7994	.7671	.7340
29	29	.9844	.9825	.9789	.9734	.9654	.9546	.9405	.9230	.9020	.8779	.8508	.8215	.7905	.7584
30	30	.9884	.9868	.9839	.9793	.9727	.9634	.9512	.9357	.9168	.8946	.8695	.8419	.8123	.7814
32	32	.9937	.9927	.9909	.9879	.9834	.9768	.9678	.9559	.9409	.9227	.9014	.8773	.8509	.8227
34	34	.9967	.9961	.9950	.9931	.9902	.9857	.9793	.9705	.9590	.9444	.9269	.9064	.8834	.8581
36	36	.9984	.9980	.9974	.9963	.9944	.9915	.9871	.9808	.9721	.9608	.9467	.9298	.9101	.8880
38	38	.9992	.9990	.9987	.9980	.9969	.9951	.9921	.9878	.9815	.9730	.9619	.9481	.9317	.9128
40	40	.9996	.9995	.9994	.9990	.9983	.9972	.9953	.9924	.9880	.9817	.9732	.9623	.9489	.9330
42	42	.9998	.9998	.9997	.9995	.9991	.9985	.9973	.9954	.9924	.9878	.9815	.9731	.9623	.9492
44	44	.9999	.9999	.9999	.9998	.9996	.9992	.9985	.9973	.9952	.9921	.9875	.9811	.9726	.9620
46	46	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9992	.9984	.9971	.9950	.9917	.9869	.9804	.9720
48	48	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9996	.9991	.9983	.9969	.9946	.9911	.9862	.9796
50	50	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9990	.9981	.9965	.9940	.9904	.9853

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0015	.0014	.0013	.0012	.0011	.0010	.0009	.0009	.0008	.0007	.0007	.0006	.0006	.0006
2	.0061	.0056	.0051	.0047	.0043	.0040	.0037	.0034	.0032	.0030	.0028	.0026	.0024	.0023
3	.0138	.0126	.0115	.0106	.0097	.0090	.0083	.0077	.0071	.0066	.0062	.0058	.0054	.0051
4	.0243	.0222	.0204	.0187	.0172	.0159	.0147	.0136	.0126	.0118	.0110	.0103	.0096	.0090
5	.0377	.0345	.0316	.0291	.0268	.0247	.0228	.0212	.0197	.0183	.0171	.0160	.0150	.0140
6	.0539	.0493	.0452	.0416	.0383	.0354	.0327	.0304	.0282	.0263	.0245	.0229	.0215	.0202
7	.0726	.0665	.0610	.0561	.0518	.0478	.0443	.0411	.0382	.0356	.0332	.0311	.0291	.0273
8	.0938	.0860	.0790	.0727	.0671	.0620	.0574	.0533	.0496	.0462	.0432	.0404	.0379	.0356
9	.1172	.1075	.0989	.0911	.0841	.0778	.0721	.0670	.0624	.0582	.0543	.0509	.0477	.0448
1.0	.1426	.1310	.1206	.1112	.1028	.0952	.0883	.0821	.0764	.0713	.0666	.0624	.0585	.0550
1.1	.1699	.1503	.1440	.1330	.1230	.1140	.1058	.0984	.0917	.0856	.0801	.0750	.0704	.0662
1.2	.1987	.1831	.1690	.1562	.1446	.1341	.1246	.1160	.1082	.1010	.0945	.0886	.0832	.0782
1.3	.2290	.2113	.1953	.1807	.1675	.1555	.1446	.1347	.1257	.1175	.1100	.1032	.0969	.0912
1.4	.2603	.2406	.2227	.2064	.1915	.1780	.1657	.1545	.1443	.1350	.1264	.1186	.1115	.1049
1.5	.2926	.2710	.2511	.2331	.2165	.2015	.1878	.1752	.1638	.1533	.1437	.1350	.1269	.1195
1.6	.3255	.3020	.2804	.2606	.2424	.2259	.2107	.1968	.1841	.1725	.1618	.1521	.1431	.1348
1.7	.3589	.3336	.3103	.2888	.2691	.2510	.2344	.2192	.2053	.1925	.1807	.1699	.1600	.1508
1.8	.3925	.3656	.3406	.3176	.2963	.2768	.2588	.2423	.2271	.2131	.2002	.1884	.1775	.1675
1.9	.4262	.3977	.3712	.3467	.3240	.3030	.2837	.2659	.2495	.2343	.2204	.2075	.1957	.1847
2.0	.4596	.4298	.4020	.3761	.3520	.3297	.3091	.2900	.2724	.2561	.2411	.2272	.2144	.2025
2.1	.4926	.4617	.4327	.4055	.3812	.3566	.3347	.3145	.2957	.2783	.2622	.2473	.2336	.2208
2.2	.5251	.4933	.4632	.4349	.4084	.3837	.3607	.3393	.3194	.3009	.2838	.2679	.2532	.2395
2.3	.5569	.5243	.4934	.4641	.4366	.4108	.3867	.3642	.3433	.3238	.3057	.2888	.2732	.2586
2.4	.5878	.5547	.5231	.4930	.4646	.4379	.4128	.3893	.3674	.3469	.3278	.3101	.2935	.2780
2.5	.6177	.5843	.5522	.5215	.4923	.4647	.4388	.4144	.3915	.3702	.3502	.3315	.3141	.2978
2.6	.6465	.6130	.5806	.5494	.5196	.4914	.4646	.4394	.4157	.3935	.3726	.3531	.3348	.3177
2.7	.6742	.6408	.6082	.5767	.5465	.5176	.4902	.4643	.4398	.4168	.3951	.3748	.3558	.3379
2.8	.7007	.6675	.6350	.6033	.5727	.5434	.5155	.4889	.4638	.4400	.4177	.3966	.3768	.3582
2.9	.7258	.6931	.6607	.6291	.5983	.5687	.5403	.5133	.4875	.4632	.4401	.4184	.3978	.3785
3.0	.7496	.7175	.6855	.6540	.6232	.5934	.5647	.5372	.5110	.4861	.4624	.4400	.4189	.3989
3.2	.7931	.7526	.7319	.7011	.6707	.6408	.6119	.5839	.5569	.5311	.5065	.4830	.4608	.4396
3.4	.8311	.8028	.7737	.7442	.7146	.6853	.6564	.6283	.6011	.5747	.5494	.5252	.5020	.4800
3.6	.8638	.8380	.8110	.7831	.7548	.7264	.6981	.6703	.6431	.6166	.5909	.5662	.5424	.5196
3.8	.8916	.8684	.8437	.8178	.7912	.7640	.7367	.7095	.6827	.6563	.6306	.6056	.5814	.5581
4.0	.9147	.8943	.8721	.8484	.8237	.7981	.7721	.7459	.7197	.6938	.6683	.6433	.6190	.5955
4.2	.9337	.9161	.8964	.8751	.8524	.8286	.8041	.7792	.7540	.7288	.7038	.6791	.6549	.6313
4.4	.9491	.9341	.9170	.8980	.8775	.8557	.8325	.8094	.7854	.7612	.7369	.7128	.6889	.6655
4.6	.9614	.9488	.9341	.9175	.8992	.8795	.8595	.8366	.8140	.7909	.7676	.7442	.7209	.6973
4.8	.9711	.9637	.9483	.9339	.9178	.9001	.8811	.8609	.8398	.8181	.7959	.7734	.7508	.7283
5.0	.9786	.9701	.9598	.9476	.9336	.9179	.9008	.8824	.8625	.8426	.8217	.8003	.7786	.7568

A(R,I,N) = PROB(AT LEAST ONE HIT) FOR N = 1

R	T	2.5	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0095	.0035	.0004	.0004	.0004	.0003	.0003	.0003	.0002	.0002	.0002	.0002
2	1	.0021	.0010	.0018	.0016	.0014	.0013	.0012	.0011	.0010	.0009	.0008	.0008
3	1	.0048	.0045	.0040	.0036	.0032	.0029	.0026	.0024	.0022	.0020	.0019	.0017
4	1	.0085	.0080	.0071	.0064	.0057	.0052	.0047	.0043	.0039	.0036	.0033	.0031
5	1	.0132	.0124	.0111	.0099	.0089	.0081	.0073	.0067	.0061	.0056	.0052	.0048
6	1	.0190	.0178	.0159	.0142	.0128	.0116	.0105	.0096	.0088	.0081	.0075	.0069
7	1	.0257	.0242	.0216	.0193	.0174	.0157	.0143	.0131	.0120	.0110	.0101	.0094
8	1	.0334	.0315	.0281	.0252	.0227	.0205	.0187	.0170	.0156	.0143	.0132	.0122
9	1	.0421	.0397	.0354	.0317	.0286	.0259	.0235	.0215	.0197	.0181	.0167	.0155
10	1	.0518	.0488	.0435	.0390	.0352	.0319	.0290	.0265	.0243	.0223	.0206	.0191
11	1	.0623	.0587	.0524	.0470	.0424	.0384	.0350	.0319	.0292	.0269	.0249	.0230
12	1	.0737	.0695	.0621	.0557	.0503	.0456	.0415	.0379	.0347	.0320	.0295	.0273
13	1	.0859	.0810	.0724	.0651	.0587	.0533	.0485	.0443	.0407	.0374	.0345	.0320
14	1	.0989	.0934	.0835	.0751	.0678	.0615	.0560	.0512	.0470	.0433	.0399	.0370
15	1	.1127	.1064	.0952	.0857	.0774	.0703	.0640	.0586	.0538	.0495	.0457	.0424
16	1	.1272	.1202	.1076	.0969	.0876	.0796	.0725	.0664	.0609	.0561	.0519	.0480
17	1	.1424	.1345	.1206	.1087	.0983	.0893	.0815	.0746	.0685	.0631	.0583	.0541
18	1	.1582	.1496	.1342	.1210	.1096	.0996	.0905	.0832	.0765	.0705	.0652	.0604
19	1	.1745	.1652	.1484	.1339	.1213	.1103	.1007	.0923	.0848	.0782	.0723	.0671
20	1	.1915	.1813	.1630	.1472	.1335	.1215	.1110	.1017	.0936	.0863	.0798	.0740
21	1	.2089	.1979	.1781	.1610	.1461	.1331	.1217	.1116	.1026	.0947	.0876	.0813
22	1	.2268	.2149	.1937	.1753	.1592	.1451	.1327	.1218	.1121	.1035	.0958	.0889
23	1	.2450	.2324	.2097	.1899	.1726	.1574	.1441	.1323	.1218	.1125	.1042	.0967
24	1	.2637	.2502	.2260	.2049	.1864	.1702	.1558	.1432	.1319	.1219	.1129	.1049
25	1	.2826	.2684	.2427	.2203	.2006	.1832	.1679	.1544	.1423	.1315	.1219	.1133
26	1	.3018	.2868	.2597	.2359	.2150	.1966	.1803	.1658	.1530	.1415	.1312	.1219
27	1	.3212	.3055	.2770	.2519	.2298	.2103	.1930	.1776	.1639	.1517	.1407	.1308
28	1	.3407	.3243	.2944	.2681	.2448	.2242	.2059	.1897	.1751	.1621	.1505	.1400
29	1	.3604	.3433	.3121	.2845	.2601	.2384	.2191	.2020	.1866	.1728	.1605	.1493
30	1	.3801	.3624	.3299	.3011	.2756	.2528	.2326	.2145	.1983	.1838	.1707	.1589
32	1	.4196	.4007	.3659	.3348	.3070	.2822	.2601	.2402	.2223	.2063	.1918	.1787
34	1	.4590	.4390	.4020	.3688	.3350	.3123	.2882	.2666	.2472	.2296	.2137	.1993
36	1	.4977	.4769	.4381	.4031	.3714	.3423	.3165	.2937	.2726	.2535	.2363	.2206
38	1	.5357	.5142	.4739	.4372	.4038	.3735	.3460	.3211	.2986	.2781	.2594	.2425
40	1	.5727	.5507	.5092	.4711	.4362	.4044	.3754	.3490	.3249	.3030	.2831	.2649
42	1	.6083	.5860	.5437	.5045	.4684	.4352	.4048	.3770	.3516	.3284	.3071	.2877
44	1	.6425	.6202	.5774	.5373	.5001	.4658	.4341	.4051	.3784	.3539	.3315	.3109
46	1	.6751	.6529	.6099	.5693	.5313	.4960	.4633	.4331	.4053	.3796	.3560	.3343
48	1	.7060	.6840	.6412	.6004	.5619	.5258	.4922	.4610	.4321	.4054	.3807	.3579
50	1	.7351	.7135	.6711	.6304	.5916	.5556	.5206	.4886	.4588	.4311	.4055	.3817

R	T	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	1	.0099	.0096	.0091	.0086	.0080	.0073	.0067	.0061	.0055	.0050	.0045	.0041	.0037	.0034
2	1	.0388	.0377	.0360	.0339	.0315	.0290	.0265	.0241	.0218	.0198	.0179	.0162	.0147	.0134
3	1	.0853	.0792	.0746	.0694	.0644	.0594	.0545	.0493	.0444	.0388	.0337	.0289	.0237	.0198
4	1	.1465	.1426	.1365	.1288	.1200	.1108	.1015	.0926	.0842	.0764	.0693	.0629	.0572	.0521
5	1	.2193	.2137	.2049	.1937	.1809	.1674	.1538	.1405	.1280	.1164	.1058	.0962	.0875	.0798
6	1	.2998	.2926	.2811	.2665	.2496	.2316	.2133	.1954	.1784	.1625	.1480	.1348	.1228	.1121
7	1	.3844	.3757	.3619	.3440	.3232	.3008	.2779	.2554	.2338	.2135	.1948	.1778	.1623	.1483
8	1	.4694	.4595	.4478	.4232	.3991	.3728	.3456	.3186	.2926	.2680	.2451	.2241	.2050	.1877
9	1	.5516	.5410	.5239	.5014	.4747	.4452	.4143	.3833	.3532	.3245	.2976	.2728	.2500	.2293
1.0	1	.6285	.6176	.5999	.5762	.5477	.5159	.4822	.4479	.4142	.3818	.3512	.3228	.2966	.2726
1.1	1	.6982	.6874	.6698	.6458	.6165	.5833	.5476	.5108	.4742	.4387	.4049	.3732	.3438	.3168
1.2	1	.7597	.7494	.7324	.7089	.6797	.6461	.6093	.5710	.5323	.4943	.4578	.4233	.3911	.3612
1.3	1	.8124	.8029	.7870	.7647	.7365	.7033	.6665	.6274	.5875	.5478	.5092	.4724	.4377	.4054
1.4	1	.8564	.8479	.8335	.8129	.7863	.7545	.7185	.6796	.6392	.5985	.5585	.5199	.4832	.4488
1.5	1	.8922	.8849	.8722	.8537	.8293	.7994	.7649	.7270	.6869	.6459	.6052	.5654	.5272	.4911
1.6	1	.9207	.9145	.9036	.8874	.8655	.8381	.8058	.7694	.7304	.6899	.6489	.6086	.5694	.5320
1.7	1	.9428	.9377	.9286	.9148	.8956	.8710	.8412	.8070	.7696	.7301	.6896	.6491	.6095	.5712
1.8	1	.9595	.9555	.9481	.9365	.9201	.8984	.8715	.8399	.8046	.7666	.7271	.6870	.6473	.6086
1.9	1	.9720	.9688	.9629	.9534	.9397	.9209	.8970	.8683	.8354	.7994	.7613	.7221	.6828	.6441
2.0	1	.9809	.9785	.9739	.9664	.9551	.9392	.9183	.8925	.8624	.8287	.7923	.7545	.7159	.6775
2.1	1	.9873	.9855	.9820	.9761	.9670	.9537	.9358	.9130	.8857	.8545	.8203	.7840	.7466	.7089
2.2	1	.9917	.9904	.9878	.9833	.9761	.9652	.9500	.9302	.9058	.8772	.8453	.8109	.7749	.7382
2.3	1	.9947	.9938	.9919	.9885	.9829	.9741	.9615	.9444	.9228	.8970	.8676	.8352	.8009	.7654
2.4	1	.9967	.9960	.9947	.9922	.9879	.9810	.9706	.9561	.9373	.9141	.8872	.8571	.8246	.7905
2.5	1	.9979	.9975	.9966	.9948	.9916	.9862	.9777	.9656	.9493	.9288	.9044	.8766	.8461	.8136
2.6	1	.9988	.9985	.9978	.9966	.9942	.9900	.9833	.9733	.9594	.9414	.9195	.8940	.8655	.8348
2.7	1	.9993	.9991	.9987	.9978	.9961	.9929	.9876	.9794	.9676	.9520	.9325	.9093	.8830	.8542
2.8	1	.9996	.9995	.9992	.9986	.9974	.9950	.9903	.9842	.9744	.9609	.9437	.9228	.8986	.8717
2.9	1	.9998	.9997	.9995	.9991	.9983	.9965	.9934	.9880	.9799	.9684	.9533	.9346	.9126	.8876
3.0	1	.9999	.9998	.9997	.9994	.9989	.9976	.9952	.9910	.9843	.9746	.9615	.9449	.9249	.9019
3.2	1	1.0000	.9999	.9999	.9998	.9995	.9989	.9976	.9950	.9907	.9839	.9742	.9614	.9453	.9261
3.4	1	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9988	.9973	.9946	.9900	.9831	.9735	.9608	.9452
3.6	1	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994	.9986	.9970	.9940	.9892	.9821	.9724	.9600
3.8	1	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9983	.9965	.9932	.9882	.9809	.9712
4.0	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9991	.9980	.9959	.9923	.9870	.9796
4.2	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9989	.9975	.9951	.9913	.9858
4.4	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994	.9986	.9970	.9943	.9902
4.6	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9992	.9982	.9963	.9934
4.8	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9989	.9977	.9956
5.0	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9994	.9986	.9971

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0031	.0028	.0026	.0024	.0022	.0020	.0018	.0017	.0016	.0015	.0014	.0013	.0012	.0011
2	.0122	.0111	.0102	.0094	.0086	.0079	.0072	.0068	.0063	.0059	.0055	.0051	.0048	.0045
3	.0271	.0248	.0227	.0209	.0192	.0177	.0164	.0152	.0141	.0131	.0122	.0114	.0107	.0100
4	.0475	.0434	.0398	.0366	.0337	.0311	.0287	.0266	.0248	.0230	.0215	.0201	.0188	.0177
5	.0728	.0666	.0611	.0562	.0517	.0478	.0442	.0413	.0381	.0355	.0331	.0310	.0290	.0272
6	.1025	.0938	.0861	.0792	.0730	.0675	.0625	.0580	.0539	.0502	.0469	.0438	.0411	.0385
7	.1357	.1245	.1144	.1053	.0971	.0898	.0832	.0772	.0718	.0670	.0625	.0585	.0548	.0515
8	.1720	.1579	.1453	.1339	.1236	.1144	.1061	.0985	.0917	.0855	.0799	.0748	.0701	.0659
9	.2106	.1937	.1784	.1646	.1521	.1419	.1307	.1215	.1132	.1057	.0988	.0925	.0868	.0815
1.0	.2508	.2310	.2131	.1969	.1822	.1689	.1569	.1460	.1361	.1271	.1189	.1114	.1045	.0983
1.1	.2920	.2695	.2490	.2303	.2125	.1981	.1842	.1716	.1601	.1496	.1400	.1313	.1232	.1159
1.2	.3337	.3086	.2856	.2646	.2456	.2282	.2124	.1980	.1849	.1730	.1620	.1520	.1428	.1344
1.3	.3754	.3478	.3225	.2994	.2782	.2589	.2413	.2252	.2105	.1970	.1847	.1734	.1631	.1536
1.4	.4167	.3869	.3595	.3343	.3112	.2900	.2706	.2528	.2366	.2217	.2080	.1954	.1839	.1733
1.5	.4571	.4255	.3962	.3691	.3442	.3212	.3001	.2808	.2630	.2467	.2317	.2179	.2052	.1934
1.6	.4966	.4633	.4324	.4036	.3770	.3524	.3298	.3089	.2897	.2720	.2557	.2407	.2268	.2140
1.7	.5347	.5002	.4679	.4376	.4095	.3835	.3594	.3371	.3165	.2975	.2799	.2637	.2487	.2349
1.8	.5714	.5359	.5024	.4710	.4416	.4142	.3888	.3652	.3433	.3231	.3043	.2870	.2709	.2560
1.9	.6065	.5704	.5360	.5036	.4731	.4445	.4179	.3931	.3701	.3487	.3288	.3104	.2933	.2774
2.0	.6399	.6034	.5685	.5352	.5039	.4743	.4467	.4208	.3967	.3742	.3533	.3330	.3157	.2989
2.1	.6715	.6350	.5997	.5660	.5339	.5035	.4750	.4482	.4231	.3996	.3777	.3573	.3382	.3205
2.2	.7013	.6651	.6297	.5956	.5631	.5321	.5028	.4752	.4492	.4249	.4021	.3807	.3608	.3422
2.3	.7294	.6935	.6584	.6242	.5913	.5599	.5300	.5017	.4750	.4498	.4262	.4041	.3833	.3638
2.4	.7556	.7204	.6857	.6516	.6186	.5869	.5565	.5277	.5003	.4745	.4502	.4273	.4057	.3855
2.5	.7800	.7458	.7116	.6778	.6449	.6130	.5824	.5531	.5252	.4988	.4738	.4503	.4280	.4071
2.6	.8026	.7695	.7360	.7028	.6701	.6382	.6075	.5779	.5496	.5227	.4972	.4730	.4502	.4286
2.7	.8235	.7916	.7591	.7265	.6942	.6625	.6317	.6020	.5735	.5462	.5202	.4955	.4721	.4499
2.8	.8427	.8122	.7808	.7490	.7172	.6859	.6552	.6254	.5967	.5692	.5428	.5177	.4938	.4711
2.9	.8603	.8313	.8010	.7701	.7391	.7082	.6778	.6481	.6193	.5916	.5649	.5395	.5151	.4920
3.0	.8764	.8489	.8199	.7901	.7598	.7295	.6995	.6700	.6413	.6134	.5866	.5608	.5362	.5127
3.2	.9041	.8799	.8537	.8262	.7979	.7690	.7401	.7113	.6830	.6553	.6283	.6023	.5772	.5530
3.4	.9267	.9057	.8825	.8576	.8315	.8045	.7770	.7493	.7217	.6945	.6678	.6417	.6164	.5920
3.6	.9447	.9269	.9067	.8846	.8608	.8359	.8101	.7838	.7573	.7309	.7047	.6790	.6538	.6293
3.8	.9589	.9440	.9267	.9073	.8861	.8634	.8396	.8149	.7898	.7644	.7391	.7139	.6890	.6647
4.0	.9698	.9577	.9431	.9264	.9077	.8873	.8656	.8427	.8192	.7951	.7707	.7464	.7221	.6982
4.2	.9782	.9684	.9564	.9421	.9259	.9078	.8882	.8673	.8454	.8228	.7997	.7764	.7529	.7296
4.4	.9844	.9767	.9669	.9550	.9410	.9252	.9078	.8889	.8688	.8478	.8261	.8039	.7814	.7588
4.6	.9891	.9830	.9752	.9653	.9535	.9399	.9245	.9076	.8894	.8700	.8498	.8289	.8076	.7860
4.8	.9924	.9878	.9816	.9736	.9637	.9521	.9387	.9237	.9073	.8897	.8711	.8516	.8315	.8109
5.0	.9948	.9913	.9865	.9801	.9720	.9621	.9506	.9375	.9229	.9070	.8899	.8719	.8531	.8337



R	T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0011	.0010	.0009	.0008	.0007	.0007	.0006	.0005	.0005	.0005	.0004	.0004
2	1	.0042	.0040	.0035	.0032	.0029	.0026	.0023	.0021	.0020	.0018	.0017	.0015
3	1	.0094	.0089	.0079	.0071	.0064	.0058	.0052	.0048	.0044	.0040	.0037	.0034
4	1	.0166	.0156	.0139	.0124	.0112	.0101	.0092	.0084	.0077	.0071	.0065	.0060
5	1	.0256	.0241	.0214	.0192	.0173	.0156	.0142	.0130	.0119	.0109	.0101	.0093
6	1	.0362	.0341	.0304	.0272	.0245	.0222	.0202	.0184	.0169	.0155	.0143	.0132
7	1	.0484	.0456	.0407	.0364	.0328	.0297	.0270	.0247	.0226	.0208	.0192	.0177
8	1	.0620	.0584	.0521	.0467	.0421	.0381	.0346	.0316	.0290	.0267	.0246	.0227
9	1	.0767	.0723	.0645	.0579	.0522	.0473	.0430	.0393	.0360	.0331	.0305	.0283
1.0	1	.0925	.0872	.0779	.0699	.0631	.0571	.0520	.0475	.0436	.0401	.0370	.0342
1.1	1	.1092	.1030	.0921	.0827	.0746	.0676	.0616	.0563	.0516	.0475	.0438	.0406
1.2	1	.1267	.1196	.1069	.0961	.0868	.0787	.0717	.0655	.0601	.0553	.0511	.0473
1.3	1	.1448	.1367	.1224	.1101	.0995	.0903	.0822	.0752	.0690	.0636	.0587	.0544
1.4	1	.1635	.1544	.1384	.1245	.1126	.1023	.0932	.0853	.0783	.0721	.0666	.0617
1.5	1	.1826	.1726	.1548	.1395	.1262	.1147	.1046	.0958	.0879	.0810	.0749	.0694
1.6	1	.2022	.1912	.1717	.1548	.1402	.1275	.1163	.1065	.0979	.0902	.0834	.0773
1.7	1	.2220	.2102	.1889	.1705	.1545	.1406	.1284	.1177	.1082	.0997	.0922	.0855
1.8	1	.2422	.2294	.2064	.1865	.1692	.1540	.1408	.1291	.1187	.1095	.1013	.0940
1.9	1	.2626	.2489	.2242	.2028	.1841	.1678	.1534	.1408	.1295	.1196	.1107	.1027
2.0	1	.2832	.2686	.2423	.2194	.1994	.1818	.1664	.1527	.1406	.1299	.1203	.1116
2.1	1	.3039	.2885	.2606	.2362	.2149	.1961	.1796	.1650	.1520	.1404	.1301	.1208
2.2	1	.3247	.3085	.2790	.2532	.2306	.2107	.1931	.1775	.1636	.1512	.1401	.1302
2.3	1	.3456	.3286	.2976	.2704	.2465	.2254	.2067	.1902	.1754	.1622	.1504	.1398
2.4	1	.3665	.3487	.3163	.2878	.2626	.2404	.2207	.2031	.1875	.1735	.1609	.1496
2.5	1	.3874	.3689	.3352	.3053	.2789	.2555	.2348	.2162	.1997	.1849	.1716	.1596
2.6	1	.4082	.3891	.3540	.3229	.2954	.2708	.2490	.2296	.2122	.1966	.1825	.1699
2.7	1	.4290	.4092	.3729	.3406	.3119	.2863	.2635	.2431	.2248	.2084	.1936	.1803
2.8	1	.4496	.4292	.3918	.3584	.3285	.3019	.2781	.2567	.2376	.2204	.2049	.1909
2.9	1	.4700	.4491	.4106	.3761	.3452	.3176	.2928	.2705	.2506	.2325	.2163	.2016
3.0	1	.4902	.4689	.4294	.3939	.3620	.3333	.3076	.2845	.2636	.2449	.2279	.2125
3.2	1	.5299	.5078	.4666	.4293	.3955	.3650	.3375	.3127	.2902	.2699	.2515	.2348
3.4	1	.5684	.5457	.5032	.4643	.4289	.3968	.3676	.3412	.3172	.2954	.2756	.2575
3.6	1	.6055	.5825	.5390	.4989	.4621	.4284	.3978	.3698	.3444	.3212	.3000	.2807
3.8	1	.6409	.6178	.5737	.5327	.4948	.4599	.4279	.3986	.3718	.3473	.3248	.3043
4.0	1	.6746	.6516	.6073	.5657	.5269	.4909	.4578	.4272	.3992	.3735	.3498	.3281
4.2	1	.7065	.6837	.6395	.5976	.5582	.5214	.4873	.4557	.4266	.3997	.3749	.3521
4.4	1	.7363	.7140	.6703	.6284	.5887	.5513	.5164	.4839	.4538	.4259	.4001	.3763
4.6	1	.7642	.7425	.6996	.6580	.6182	.5804	.5450	.5117	.4808	.4520	.4252	.4004
4.8	1	.7901	.7691	.7273	.6862	.6466	.6087	.5728	.5390	.5074	.4778	.4502	.4245
5.0	1	.8139	.7938	.7523	.7131	.6738	.6360	.6000	.5658	.5336	.5033	.4750	.4485

A(R,T,N) = PROBIT AT LEAST ONE HIT FOR N = 3

R T	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
.1	.0147	.0143	.0137	.0129	.0113	.0110	.0100	.0091	.0083	.0075	.0068	.0061	.0056	.0051
.2	.0577	.0501	.0536	.0504	.0468	.0431	.0394	.0359	.0325	.0295	.0267	.0242	.0220	.0200
.3	.1251	.1217	.1165	.1098	.1022	.0943	.0863	.0787	.0714	.0648	.0588	.0533	.0484	.0441
.4	.2115	.2061	.1975	.1867	.1743	.1611	.1479	.1350	.1229	.1117	.1014	.0921	.0838	.0763
.5	.3102	.3027	.2909	.2757	.2583	.2395	.2205	.2019	.1843	.1678	.1527	.1390	.1266	.1155
.6	.4141	.4049	.3903	.3713	.3491	.3250	.3003	.2759	.2526	.2306	.2103	.1918	.1751	.1599
.7	.5170	.5066	.4900	.4679	.4419	.4132	.3834	.3536	.3248	.2975	.2721	.2488	.2275	.2083
.8	.6134	.6025	.5848	.5609	.5322	.5001	.4662	.4319	.3983	.3661	.3359	.3080	.2823	.2590
.9	.6997	.6889	.6710	.6466	.6166	.5825	.5458	.5080	.4705	.4342	.3998	.3676	.3380	.3108
1.0	.7735	.7634	.7463	.7226	.6927	.6579	.6197	.5798	.5395	.5000	.4621	.4264	.3932	.3625
1.1	.8342	.8251	.8096	.7874	.7589	.7248	.6866	.6458	.6039	.5622	.5218	.4832	.4470	.4133
1.2	.8822	.8744	.8609	.8411	.8148	.7826	.7455	.7050	.6627	.6200	.5778	.5372	.4987	.4625
1.3	.9187	.9124	.9010	.8840	.8606	.8311	.7962	.7572	.7155	.6726	.6298	.5879	.5476	.5095
1.4	.9456	.9406	.9314	.9172	.8972	.8710	.8390	.8023	.7622	.7200	.6772	.6348	.5936	.5542
1.5	.9646	.9608	.9537	.9423	.9256	.9029	.8744	.8406	.8028	.7622	.7202	.6780	.6364	.5962
1.6	.9777	.9749	.9696	.9607	.9472	.9281	.9032	.8727	.8377	.7993	.7588	.7173	.6760	.6355
1.7	.9863	.9844	.9805	.9739	.9632	.9475	.9262	.8993	.8674	.8316	.7931	.7530	.7124	.6722
1.8	.9919	.9906	.9879	.9830	.9748	.9622	.9443	.9210	.8925	.8596	.8235	.7851	.7457	.7061
1.9	.9953	.9944	.9926	.9891	.9830	.9731	.9585	.9386	.9134	.8837	.8501	.8139	.7760	.7375
2.0	.9974	.9968	.9956	.9932	.9888	.9811	.9693	.9526	.9308	.9042	.8734	.8396	.8035	.7663
2.1	.9986	.9982	.9975	.9959	.9927	.9869	.9776	.9638	.9451	.9215	.8937	.8623	.8284	.7927
2.2	.9992	.9990	.9986	.9975	.9953	.9911	.9838	.9725	.9567	.9361	.9112	.8824	.8507	.8169
2.3	.9996	.9995	.9992	.9985	.9970	.9940	.9884	.9794	.9661	.9484	.9262	.9000	.8706	.8388
2.4	.9998	.9997	.9996	.9992	.9982	.9960	.9918	.9846	.9737	.9585	.9390	.9154	.8884	.8586
2.5	.9999	.9999	.9998	.9995	.9989	.9973	.9942	.9886	.9797	.9669	.9499	.9288	.9041	.8765
2.6	1.0000	.9999	.9999	.9997	.9993	.9983	.9960	.9917	.9845	.9737	.9590	.9404	.9180	.8925
2.7	1.0000	1.0000	.9999	.9999	.9996	.9989	.9972	.9940	.9882	.9793	.9667	.9503	.9302	.9068
2.8	1.0000	1.0000	1.0000	.9999	.9998	.9993	.9981	.9956	.9911	.9838	.9731	.9588	.9409	.9196
2.9	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9987	.9969	.9934	.9874	.9784	.9660	.9501	.9308
3.0	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9992	.9978	.9951	.9903	.9828	.9721	.9581	.9408
3.2	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9989	.9974	.9943	.9892	.9815	.9708	.9571
3.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9986	.9968	.9934	.9880	.9801	.9694
3.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9993	.9982	.9961	.9924	.9866	.9785
3.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9990	.9977	.9952	.9912	.9852
4.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9995	.9987	.9971	.9943	.9899
4.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9983	.9964	.9933
4.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9990	.9978	.9956
4.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994	.9986	.9972
4.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9992	.9982
5.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9989

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
.1	.0040	.0042	.0038	.0035	.0032	.0030	.0028	.0026	.0024	.0022	.0021	.0019	.0018	.0017
.2	.0182	.0166	.0152	.0140	.0128	.0118	.0110	.0101	.0094	.0088	.0082	.0076	.0072	.0067
.3	.0402	.0367	.0336	.0309	.0284	.0262	.0243	.0225	.0209	.0194	.0181	.0169	.0159	.0149
.4	.0597	.0537	.0504	.0477	.0454	.0436	.0422	.0391	.0364	.0339	.0310	.0295	.0277	.0259
.5	.1055	.0966	.0886	.0815	.0751	.0693	.0642	.0595	.0553	.0516	.0481	.0450	.0422	.0396
.6	.1463	.1341	.1232	.1134	.1046	.0967	.0895	.0831	.0773	.0720	.0673	.0629	.0590	.0554
.7	.1909	.1752	.1611	.1485	.1371	.1268	.1175	.1092	.1016	.0948	.0885	.0829	.0777	.0730
.8	.2378	.2187	.2014	.1858	.1717	.1590	.1476	.1372	.1278	.1192	.1114	.1044	.0979	.0920
.9	.2860	.2634	.2430	.2245	.2078	.1927	.1790	.1665	.1552	.1449	.1356	.1270	.1192	.1121
1.0	.3344	.3087	.2853	.2640	.2447	.2271	.2112	.1967	.1836	.1715	.1606	.1506	.1414	.1330
1.1	.3822	.3536	.3275	.3036	.2818	.2620	.2439	.2274	.2124	.1987	.1862	.1747	.1642	.1545
1.2	.4288	.3977	.3691	.3428	.3188	.2968	.2767	.2583	.2415	.2262	.2121	.1992	.1873	.1764
1.3	.4738	.4406	.4058	.3814	.3553	.3313	.3094	.2892	.2707	.2537	.2382	.2238	.2107	.1985
1.4	.5169	.4819	.4493	.4191	.3911	.3654	.3417	.3198	.2998	.2813	.2643	.2486	.2342	.2209
1.5	.5578	.5215	.4875	.4557	.4261	.3988	.3735	.3501	.3286	.3087	.2904	.2734	.2578	.2433
1.6	.5965	.5593	.5241	.4911	.4602	.4315	.4048	.3800	.3571	.3359	.3163	.2982	.2814	.2658
1.7	.6329	.5952	.5592	.5252	.4933	.4634	.4355	.4095	.3853	.3629	.3421	.3229	.3050	.2884
1.8	.6671	.6292	.5928	.5581	.5253	.4944	.4654	.4384	.4132	.3896	.3678	.3474	.3285	.3109
1.9	.6990	.6613	.6247	.5896	.5562	.5245	.4947	.4667	.4405	.4160	.3932	.3718	.3519	.3334
2.0	.7287	.6915	.6550	.6197	.5859	.5537	.5232	.4945	.4674	.4420	.4183	.3960	.3752	.3558
2.1	.7563	.7198	.6837	.6485	.6145	.5820	.5510	.5216	.4938	.4677	.4431	.4200	.3984	.3782
2.2	.7818	.7462	.7108	.6759	.6419	.6092	.5778	.5480	.5196	.4928	.4676	.4438	.4214	.4004
2.3	.8053	.7709	.7362	.7018	.6681	.6354	.6039	.5737	.5449	.5176	.4917	.4672	.4442	.4225
2.4	.8268	.7938	.7601	.7264	.6931	.6606	.6290	.5986	.5695	.5417	.5154	.4904	.4667	.4444
2.5	.8465	.8149	.7825	.7496	.7163	.6847	.6532	.6228	.5934	.5654	.5386	.5131	.4889	.4660
2.6	.8644	.8345	.8033	.7714	.7394	.7077	.6765	.6461	.6167	.5884	.5613	.5355	.5108	.4874
2.7	.8807	.8524	.8226	.7919	.7607	.7296	.6988	.6686	.6392	.6108	.5835	.5574	.5324	.5086
2.8	.8954	.8688	.8405	.8110	.7808	.7504	.7201	.6902	.6610	.6326	.6052	.5788	.5535	.5294
2.9	.9086	.8838	.8570	.8288	.7997	.7701	.7404	.7109	.6820	.6537	.6262	.5997	.5743	.5498
3.0	.9204	.8973	.8722	.8453	.8173	.7887	.7597	.7308	.7021	.6741	.6467	.6202	.5945	.5699
3.2	.9403	.9207	.8987	.8747	.8492	.8226	.7953	.7677	.7401	.7127	.6857	.6593	.6336	.6087
3.4	.9558	.9395	.9207	.8996	.8767	.8524	.8271	.8011	.7747	.7483	.7220	.6960	.6706	.6457
3.6	.9678	.9545	.9386	.9204	.9002	.8783	.8551	.8309	.8061	.7808	.7555	.7303	.7053	.6808
3.8	.9769	.9662	.9530	.9376	.9200	.9005	.8795	.8573	.8342	.8104	.7863	.7620	.7377	.7137
4.0	.9837	.9752	.9645	.9515	.9365	.9194	.9007	.8805	.8592	.8370	.8142	.7911	.7677	.7444
4.2	.9886	.9821	.9735	.9628	.9500	.9353	.9188	.9007	.8813	.8608	.8395	.8176	.7954	.7729
4.4	.9922	.9872	.9804	.9717	.9611	.9485	.9341	.9180	.9005	.8818	.8621	.8417	.8206	.7992
4.6	.9947	.9910	.9857	.9788	.9700	.9594	.9470	.9329	.9173	.9003	.8833	.8653	.8463	.8273
4.8	.9965	.9937	.9897	.9842	.9771	.9682	.9577	.9454	.9317	.9165	.9001	.8826	.8643	.8453
5.0	.9977	.9957	.9927	.9884	.9827	.9754	.9665	.9560	.9439	.9305	.9157	.8998	.8829	.8651

A(R,T,N) = PROBAB( AT LEAST ONE HIT) FOR N = 3

R T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0016	.0015	.0013	.0012	.0011	.0010	.0009	.0008	.0007	.0007	.0006	.0006
2	.0063	.0059	.0053	.0047	.0043	.0038	.0035	.0032	.0029	.0027	.0025	.0023
3	.0140	.0132	.0117	.0105	.0094	.0085	.0078	.0071	.0065	.0060	.0055	.0051
4	.0244	.0230	.0204	.0183	.0165	.0149	.0135	.0124	.0113	.0104	.0096	.0089
5	.0372	.0350	.0312	.0279	.0252	.0228	.0207	.0189	.0173	.0159	.0147	.0136
6	.0521	.0490	.0437	.0391	.0353	.0319	.0290	.0265	.0243	.0223	.0206	.0190
7	.0680	.0647	.0576	.0517	.0466	.0422	.0383	.0350	.0321	.0295	.0272	.0252
8	.0865	.0816	.0728	.0653	.0588	.0533	.0485	.0443	.0406	.0373	.0344	.0319
9	.1055	.0995	.0888	.0797	.0719	.0652	.0593	.0542	.0497	.0457	.0422	.0390
10	.1253	.1182	.1056	.0948	.0856	.0776	.0706	.0646	.0592	.0545	.0503	.0466
11	.1456	.1374	.1229	.1105	.0998	.0905	.0824	.0754	.0691	.0636	.0588	.0544
12	.1663	.1571	.1406	.1265	.1143	.1038	.0946	.0865	.0794	.0731	.0675	.0625
13	.1874	.1770	.1587	.1428	.1292	.1173	.1070	.0979	.0899	.0828	.0765	.0709
14	.2086	.1972	.1769	.1595	.1443	.1312	.1197	.1096	.1007	.0928	.0857	.0795
15	.2299	.2176	.1954	.1763	.1597	.1453	.1326	.1215	.1117	.1029	.0952	.0882
16	.2514	.2380	.2141	.1933	.1753	.1596	.1458	.1336	.1229	.1133	.1048	.0972
17	.2729	.2586	.2329	.2105	.1911	.1741	.1591	.1460	.1343	.1239	.1147	.1064
18	.2945	.2792	.2518	.2279	.2071	.1888	.1727	.1585	.1459	.1347	.1247	.1158
19	.3161	.3000	.2709	.2455	.2232	.2037	.1865	.1713	.1578	.1457	.1350	.1253
20	.3377	.3207	.2900	.2631	.2396	.2188	.2005	.1843	.1698	.1570	.1454	.1351
21	.3592	.3414	.3092	.2809	.2560	.2341	.2147	.1974	.1821	.1684	.1561	.1451
22	.3807	.3622	.3285	.2988	.2727	.2495	.2290	.2108	.1945	.1800	.1669	.1552
23	.4020	.3828	.3478	.3168	.2894	.2651	.2435	.2243	.2071	.1918	.1780	.1655
24	.4233	.4034	.3671	.3348	.3062	.2808	.2582	.2380	.2199	.2037	.1892	.1761
25	.4444	.4239	.3863	.3529	.3232	.2966	.2730	.2518	.2329	.2159	.2006	.1867
26	.4653	.4442	.4056	.3710	.3401	.3126	.2879	.2658	.2460	.2282	.2121	.1976
27	.4859	.4644	.4247	.3891	.3571	.3285	.3029	.2799	.2592	.2406	.2238	.2086
28	.5063	.4844	.4437	.4071	.3742	.3446	.3180	.2941	.2726	.2532	.2356	.2197
29	.5264	.5041	.4626	.4250	.3912	.3607	.3332	.3084	.2861	.2659	.2476	.2310
30	.5462	.5235	.4813	.4429	.4081	.3768	.3484	.3228	.2996	.2787	.2597	.2424
32	.5847	.5616	.5181	.4782	.4419	.4089	.3789	.3517	.3270	.3046	.2842	.2656
34	.6216	.5982	.5539	.5129	.4753	.4408	.4094	.3807	.3546	.3308	.3090	.2892
36	.6567	.6333	.5886	.5468	.5081	.4725	.4397	.4097	.3823	.3571	.3341	.3130
38	.6900	.6667	.6219	.5797	.5402	.5036	.4698	.4386	.4099	.3836	.3594	.3371
40	.7213	.6984	.6539	.6115	.5715	.5342	.4994	.4672	.4375	.4100	.3847	.3614
42	.7505	.7281	.6843	.6420	.6018	.5640	.5285	.4955	.4648	.4363	.4100	.3857
44	.7776	.7560	.7131	.6713	.6311	.5930	.5570	.5233	.4918	.4625	.4353	.4100
46	.8027	.7819	.7402	.6991	.6592	.6210	.5848	.5506	.5184	.4884	.4603	.4342
48	.8258	.8059	.7656	.7255	.6861	.6481	.6117	.5772	.5446	.5139	.4852	.4583
50	.8468	.8279	.7894	.7504	.7118	.6741	.6378	.6031	.5701	.5390	.5097	.4821

R	I	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	1	.0196	.0191	.0182	.0171	.0159	.0146	.0133	.0121	.0110	.0099	.0090	.0082	.0074	.0067
2	1	.0762	.0740	.0708	.0666	.0619	.0570	.0522	.0475	.0431	.0390	.0354	.0321	.0291	.0265
3	1	.1532	.1509	.1522	.1436	.1338	.1235	.1132	.1032	.0938	.0852	.0773	.0701	.0637	.0580
4	1	.2715	.2648	.2542	.2407	.2251	.2084	.1916	.1752	.1596	.1452	.1319	.1200	.1092	.0995
5	1	.3905	.3816	.3676	.3493	.3280	.3050	.2814	.2582	.2360	.2152	.1961	.1787	.1629	.1487
6	1	.5098	.4994	.4828	.4609	.4349	.4063	.3766	.3470	.3184	.2913	.2662	.2431	.2222	.2032
7	1	.6210	.6101	.5922	.5681	.5389	.5063	.4717	.4367	.4024	.3696	.3388	.3104	.2844	.2607
8	1	.7184	.7077	.6898	.6652	.6348	.5998	.5621	.5231	.4843	.4468	.4112	.3779	.3472	.3191
9	1	.7989	.7891	.7725	.7489	.7189	.6835	.6444	.6032	.5614	.5203	.4808	.4436	.4089	.3769
10	1	.8619	.8535	.8389	.8176	.7896	.7555	.7168	.6749	.6316	.5884	.5462	.5059	.4680	.4327
11	1	.9089	.9021	.8900	.8717	.8457	.8153	.7784	.7374	.6941	.6500	.6063	.5640	.5237	.4858
12	1	.9422	.9370	.9274	.9124	.8911	.8633	.8294	.7906	.7485	.7048	.6606	.6172	.5754	.5356
13	1	.9648	.9610	.9538	.9420	.9246	.9007	.8705	.8349	.7951	.7527	.7091	.6655	.6229	.5820
14	1	.9794	.9767	.9716	.9628	.9490	.9292	.9031	.8711	.8343	.7941	.7519	.7089	.6664	.6249
15	1	.9884	.9866	.9831	.9767	.9662	.9503	.9283	.9003	.8670	.8296	.7894	.7477	.7058	.6644
16	1	.9937	.9926	.9903	.9859	.9781	.9657	.9476	.9235	.8939	.8597	.8220	.7822	.7415	.7007
17	1	.9967	.9961	.9946	.9916	.9861	.9766	.9621	.9419	.9160	.8852	.8504	.8128	.7736	.7339
18	1	.9984	.9980	.9971	.9952	.9913	.9843	.9729	.9561	.9339	.9065	.8748	.8397	.8025	.7641
19	1	.9992	.9990	.9985	.9973	.9947	.9896	.9808	.9672	.9484	.9243	.8957	.8634	.8283	.7917
20	1	.9996	.9995	.9992	.9985	.9968	.9932	.9865	.9756	.9599	.9391	.9136	.8841	.8514	.8166
21	1	.9998	.9998	.9996	.9992	.9981	.9956	.9906	.9821	.9691	.9513	.9288	.9021	.8719	.8392
22	1	.9999	.9999	.9998	.9996	.9989	.9972	.9935	.9869	.9764	.9613	.9417	.9177	.8901	.8595
23	1	1.0000	1.0000	.9999	.9998	.9994	.9984	.9956	.9905	.9821	.9695	.9525	.9312	.9060	.8778
24	1	1.0000	1.0000	1.0000	.9999	.9996	.9989	.9970	.9932	.9865	.9761	.9615	.9427	.9201	.8940
25	1	1.0000	1.0000	1.0000	.9999	.9998	.9993	.9980	.9952	.9899	.9814	.9690	.9526	.9323	.9085
26	1	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9987	.9966	.9925	.9856	.9752	.9609	.9429	.9213
27	1	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9992	.9976	.9945	.9889	.9802	.9680	.9521	.9326
28	1	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9984	.9960	.9916	.9844	.9739	.9600	.9425
29	1	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9989	.9971	.9936	.9877	.9789	.9667	.9512
30	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9993	.9979	.9952	.9904	.9830	.9725	.9587
32	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9990	.9973	.9943	.9891	.9814	.9708
34	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9986	.9966	.9932	.9877	.9797
36	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9993	.9981	.9958	.9920	.9862
38	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9989	.9975	.9949	.9907
40	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9985	.9968	.9939
42	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9992	.9980	.9960
44	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9995	.9988	.9975
46	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9984
48	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9990
50	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994

A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 4

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0061	.0056	.0051	.0047	.0043	.0040	.0037	.0034	.0032	.0029	.0028	.0026	.0024	.0023
2	.0241	.0220	.0202	.0185	.0170	.0157	.0145	.0135	.0125	.0116	.0108	.0101	.0095	.0089
3	.0529	.0484	.0443	.0407	.0374	.0346	.0320	.0296	.0275	.0256	.0239	.0223	.0209	.0196
4	.0908	.0831	.0762	.0700	.0645	.0596	.0551	.0511	.0475	.0442	.0413	.0386	.0361	.0339
5	.1359	.1245	.1143	.1051	.0969	.0896	.0829	.0769	.0715	.0666	.0622	.0582	.0545	.0512
6	.1861	.1707	.1569	.1445	.1333	.1233	.1143	.1061	.0987	.0920	.0859	.0804	.0754	.0708
7	.2392	.2198	.2024	.1866	.1724	.1596	.1480	.1376	.1281	.1195	.1117	.1045	.0980	.0921
8	.2935	.2703	.2492	.2302	.2129	.1974	.1832	.1705	.1588	.1483	.1387	.1299	.1219	.1146
9	.3475	.3207	.2963	.2741	.2540	.2357	.2191	.2041	.1903	.1779	.1665	.1561	.1465	.1378
1.0	.4001	.3701	.3427	.3176	.2948	.2740	.2550	.2378	.2220	.2077	.1945	.1825	.1715	.1614
1.1	.4505	.4178	.3877	.3601	.3348	.3117	.2906	.2713	.2536	.2374	.2226	.2091	.1966	.1851
1.2	.4982	.4634	.4311	.4013	.3738	.3486	.3255	.3043	.2848	.2670	.2506	.2355	.2216	.2089
1.3	.5431	.5066	.4725	.4409	.4115	.3845	.3596	.3366	.3155	.2961	.2782	.2617	.2466	.2325
1.4	.5852	.5474	.5120	.4788	.4479	.4193	.3928	.3683	.3457	.3248	.3055	.2877	.2713	.2561
1.5	.6243	.5859	.5494	.5151	.4829	.4530	.4251	.3992	.3752	.3530	.3325	.3134	.2958	.2795
1.6	.6606	.6219	.5849	.5497	.5166	.4855	.4565	.4294	.4042	.3808	.3591	.3389	.3202	.3028
1.7	.6943	.6557	.6184	.5827	.5489	.5169	.4869	.4588	.4326	.4081	.3853	.3641	.3443	.3259
1.8	.7255	.6873	.6500	.6141	.5798	.5472	.5165	.4875	.4604	.4349	.4112	.3890	.3683	.3489
1.9	.7542	.7167	.6798	.6440	.6094	.5764	.5451	.5154	.4875	.4613	.4366	.4136	.3920	.3718
2.0	.7806	.7441	.7079	.6723	.6377	.6045	.5728	.5426	.5140	.4871	.4617	.4379	.4155	.3945
2.1	.8048	.7696	.7341	.6990	.6647	.6315	.5995	.5689	.5399	.5124	.4863	.4618	.4387	.4170
2.2	.8269	.7931	.7587	.7243	.6904	.6573	.6253	.5945	.5651	.5371	.5105	.4854	.4616	.4393
2.3	.8471	.8148	.7816	.7481	.7147	.6819	.6500	.6192	.5895	.5612	.5342	.5086	.4831	.4613
2.4	.8654	.8348	.8029	.7704	.7378	.7055	.6738	.6430	.6132	.5847	.5574	.5313	.5065	.4831
2.5	.8819	.8530	.8226	.7913	.7595	.7278	.6965	.6659	.6362	.6075	.5800	.5536	.5284	.5045
2.6	.8967	.8697	.8408	.8107	.7800	.7490	.7183	.6879	.6584	.6297	.6020	.5754	.5499	.5256
2.7	.9100	.8848	.8576	.8289	.7992	.7691	.7389	.7091	.6797	.6511	.6234	.5966	.5709	.5463
2.8	.9219	.8986	.8729	.8456	.8172	.7880	.7586	.7292	.7002	.6718	.6441	.6173	.5915	.5667
2.9	.9325	.9109	.8870	.8611	.8339	.8058	.7772	.7485	.7199	.6918	.6643	.6375	.6116	.5866
3.0	.9418	.9221	.8998	.8754	.8495	.8225	.7948	.7668	.7388	.7110	.6837	.6570	.6311	.6060
3.2	.9573	.9409	.9219	.9005	.8773	.8527	.8270	.8006	.7739	.7471	.7205	.6943	.6686	.6435
3.4	.9691	.9558	.9398	.9214	.9010	.8788	.8553	.8308	.8056	.7801	.7544	.7289	.7037	.6789
3.6	.9780	.9674	.9542	.9386	.9209	.9012	.8800	.8575	.8340	.8100	.7855	.7610	.7365	.7122
3.8	.9846	.9762	.9655	.9525	.9374	.9202	.9012	.8808	.8593	.8369	.8138	.7904	.7668	.7433
4.0	.9893	.9829	.9744	.9637	.9509	.9361	.9194	.9011	.8815	.8608	.8393	.8172	.7947	.7721
4.2	.9927	.9879	.9812	.9726	.9619	.9493	.9348	.9186	.9009	.8820	.8621	.8415	.8203	.7986
4.4	.9951	.9915	.9864	.9795	.9707	.9601	.9476	.9335	.9177	.9006	.8824	.8632	.8433	.8229
4.6	.9963	.9941	.9902	.9848	.9777	.9689	.9583	.9460	.9322	.9169	.9003	.8827	.8642	.8450
4.8	.9979	.9960	.9931	.9889	.9832	.9760	.9671	.9565	.9444	.9309	.9160	.8999	.8829	.8650
5.0	.9987	.9973	.9952	.9920	.9875	.9816	.9742	.9653	.9548	.9429	.9296	.9151	.8995	.8830

R I	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0021	.0020	.0018	.0016	.0014	.0013	.0012	.0011	.0010	.0009	.0008	.0008
2	.0084	.0079	.0070	.0063	.0056	.0051	.0046	.0042	.0039	.0036	.0033	.0030
3	.0184	.0174	.0154	.0138	.0124	.0113	.0102	.0093	.0085	.0078	.0072	.0067
4	.0319	.0300	.0267	.0239	.0215	.0195	.0177	.0162	.0148	.0136	.0125	.0116
5	.0481	.0453	.0404	.0362	.0326	.0295	.0268	.0244	.0224	.0206	.0190	.0176
6	.0666	.0627	.0559	.0501	.0451	.0408	.0371	.0339	.0311	.0286	.0263	.0244
7	.0867	.0817	.0728	.0653	.0589	.0533	.0485	.0443	.0406	.0373	.0344	.0318
8	.1079	.1017	.0908	.0814	.0734	.0665	.0605	.0553	.0507	.0466	.0430	.0398
9	.1298	.1224	.1094	.0982	.0886	.0803	.0731	.0668	.0613	.0564	.0520	.0482
1.0	.1521	.1435	.1283	.1153	.1041	.0945	.0860	.0786	.0721	.0664	.0613	.0568
1.1	.1746	.1648	.1476	.1327	.1199	.1088	.0992	.0907	.0832	.0767	.0708	.0656
1.2	.1971	.1862	.1669	.1502	.1359	.1234	.1125	.1030	.0945	.0871	.0804	.0745
1.3	.2196	.2076	.1863	.1679	.1519	.1381	.1260	.1153	.1060	.0976	.0902	.0836
1.4	.2420	.2290	.2057	.1856	.1681	.1529	.1396	.1279	.1175	.1084	.1002	.0929
1.5	.2644	.2503	.2251	.2034	.1844	.1679	.1534	.1406	.1293	.1192	.1103	.1023
1.6	.2866	.2716	.2446	.2212	.2008	.1829	.1672	.1534	.1412	.1303	.1205	.1118
1.7	.3088	.2929	.2642	.2392	.2173	.1982	.1813	.1664	.1532	.1415	.1310	.1216
1.8	.3309	.3141	.2837	.2572	.2339	.2135	.1955	.1796	.1654	.1528	.1416	.1315
1.9	.3529	.3353	.3033	.2753	.2507	.2290	.2099	.1929	.1778	.1644	.1523	.1415
2.0	.3748	.3564	.3229	.2935	.2675	.2447	.2244	.2064	.1904	.1761	.1633	.1518
2.1	.3966	.3774	.3425	.3117	.2845	.2604	.2391	.2201	.2032	.1880	.1744	.1622
2.2	.4182	.3983	.3621	.3300	.3015	.2763	.2533	.2339	.2161	.2001	.1857	.1728
2.3	.4396	.4191	.3816	.3483	.3186	.2923	.2688	.2479	.2291	.2123	.1972	.1835
2.4	.4608	.4398	.4011	.3666	.3358	.3084	.2839	.2620	.2423	.2247	.2088	.1944
2.5	.4818	.4602	.4204	.3848	.3530	.3245	.2990	.2762	.2556	.2372	.2205	.2055
2.6	.5024	.4804	.4397	.4030	.3702	.3407	.3142	.2905	.2691	.2498	.2324	.2167
2.7	.5228	.5004	.4588	.4212	.3873	.3569	.3295	.3049	.2827	.2626	.2445	.2280
2.8	.5429	.5201	.4777	.4392	.4045	.3731	.3449	.3193	.2963	.2755	.2566	.2395
2.9	.5625	.5395	.4964	.4571	.4216	.3893	.3602	.3339	.3100	.2884	.2689	.2511
3.0	.5818	.5586	.5149	.4749	.4385	.4055	.3756	.3484	.3238	.3015	.2812	.2627
3.2	.6192	.5956	.5511	.5099	.4722	.4377	.4063	.3776	.3516	.3278	.3062	.2864
3.4	.6547	.6311	.5861	.5441	.5053	.4696	.4368	.4068	.3794	.3543	.3314	.3104
3.6	.6883	.6649	.6198	.5773	.5377	.5010	.4671	.4359	.4072	.3809	.3567	.3345
3.8	.7193	.6968	.6520	.6093	.5692	.5317	.4969	.4647	.4349	.4074	.3822	.3589
4.0	.7494	.7269	.6827	.6402	.5998	.5617	.5262	.4931	.4624	.4339	.4076	.3833
4.2	.7768	.7550	.7117	.6696	.6293	.5909	.5549	.5211	.4895	.4602	.4329	.4077
4.4	.8021	.7811	.7391	.6977	.6576	.6192	.5828	.5485	.5163	.4862	.4581	.4320
4.6	.8253	.8053	.7647	.7243	.6847	.6465	.6099	.5753	.5426	.5118	.4831	.4562
4.8	.8465	.8275	.7886	.7494	.7105	.6727	.6362	.6013	.5683	.5371	.5077	.4801
5.0	.8657	.8478	.8108	.7729	.7350	.6977	.6615	.6266	.5934	.5618	.5319	.5038

$$A(R, T, N) = \text{PROB}(\text{AT LEAST ONE HIT}) \text{ FOR } N = 5$$

R	T	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	1	.0245	.0238	.0227	.0213	.0198	.0182	.0166	.0151	.0137	.0124	.0112	.0102	.0092	.0084
2	2	.0943	.0917	.0876	.0825	.0768	.0707	.0647	.0589	.0535	.0485	.0439	.0398	.0362	.0329
3	3	.1997	.1945	.1864	.1761	.1643	.1518	.1392	.1270	.1155	.1049	.0952	.0865	.0786	.0716
4	4	.3270	.3192	.3069	.2910	.2726	.2529	.2328	.2131	.1944	.1770	.1610	.1464	.1333	.1216
5	5	.4614	.4516	.4359	.4152	.3909	.3644	.3369	.3098	.2836	.2590	.2363	.2155	.1966	.1796
6	6	.5898	.5789	.5612	.5375	.5089	.4771	.4436	.4098	.3769	.3455	.3163	.2893	.2647	.2423
7	7	.7026	.6918	.6738	.6490	.6184	.5835	.5458	.5071	.4687	.4316	.3966	.3641	.3341	.3067
8	8	.7949	.7850	.7682	.7443	.7140	.6782	.6385	.5969	.5548	.5135	.4739	.4367	.4021	.3702
9	9	.8653	.8570	.8424	.8211	.7928	.7583	.7190	.6764	.6325	.5885	.5458	.5050	.4667	.4311
10	10	.9158	.9093	.8975	.8796	.8548	.8233	.7860	.7444	.7004	.6555	.6109	.5679	.5269	.4884
11	11	.9499	.9452	.9362	.9220	.9013	.8738	.8400	.8009	.7583	.7138	.6688	.6246	.5820	.5415
12	12	.9717	.9684	.9620	.9513	.9349	.9119	.8822	.8467	.8067	.7638	.7195	.6752	.6319	.5902
13	13	.9847	.9826	.9783	.9706	.9582	.9396	.9145	.8831	.8465	.8061	.7635	.7200	.6767	.6346
14	14	.9922	.9909	.9881	.9829	.9738	.9594	.9387	.9116	.8789	.8417	.8014	.7594	.7170	.6750
15	15	.9962	.9954	.9938	.9904	.9840	.9731	.9565	.9337	.9050	.8713	.8339	.7940	.7529	.7117
16	16	.9982	.9978	.9969	.9947	.9904	.9824	.9694	.9506	.9260	.8959	.8616	.8242	.7850	.7449
17	17	.9992	.9990	.9985	.9972	.9943	.9886	.9787	.9635	.9426	.9163	.8852	.8506	.8135	.7750
18	18	.9997	.9996	.9993	.9986	.9967	.9928	.9853	.9732	.9558	.9330	.9053	.8735	.8368	.8022
19	19	.9999	.9998	.9997	.9993	.9981	.9954	.9900	.9805	.9662	.9467	.9222	.8934	.8612	.8267
20	20	.9999	.9999	.9999	.9996	.9990	.9972	.9932	.9860	.9743	.9578	.9364	.9106	.8810	.8487
21	21	1.0000	1.0000	.9999	.9998	.9994	.9983	.9955	.9900	.9807	.9669	.9484	.9254	.8985	.8685
22	22	1.0000	1.0000	1.0000	.9999	.9997	.9989	.9970	.9929	.9855	.9741	.9583	.9380	.9137	.8860
23	23	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9980	.9950	.9893	.9800	.9665	.9408	.9270	.9017
24	24	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9987	.9965	.9921	.9846	.9733	.9579	.9385	.9155
25	25	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9976	.9942	.9882	.9788	.9656	.9484	.9277
26	26	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9984	.9958	.9910	.9833	.9720	.9570	.9383
27	27	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9989	.9970	.9930	.9869	.9773	.9643	.9477
28	28	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9993	.9979	.9950	.9898	.9818	.9705	.9558
29	29	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9985	.9963	.9921	.9854	.9757	.9628
30	30	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9990	.9972	.9939	.9884	.9801	.9688
32	32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9985	.9965	.9928	.9869	.9784
34	34	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9992	.9980	.9956	.9915	.9852
36	36	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9989	.9974	.9946	.9901
38	38	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9985	.9966	.9935
40	40	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9991	.9979	.9958
42	42	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9995	.9988	.9973
44	44	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9983
46	46	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9990
48	48	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994
50	50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996



R I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0076	.0070	.0064	.0059	.0054	.0050	.0046	.0043	.0040	.0037	.0034	.0032	.0030	.0028
2	.0300	.0274	.0251	.0230	.0212	.0195	.0181	.0167	.0155	.0145	.0135	.0126	.0118	.0111
3	.0653	.0597	.0547	.0502	.0462	.0427	.0395	.0366	.0340	.0316	.0295	.0276	.0258	.0242
4	.1111	.1017	.0932	.0857	.0790	.0729	.0675	.0626	.0582	.0542	.0506	.0473	.0443	.0416
5	.1544	.1506	.1383	.1273	.1174	.1085	.1005	.0933	.0867	.0808	.0755	.0706	.0662	.0621
6	.2222	.2040	.1876	.1729	.1596	.1477	.1369	.1271	.1183	.1103	.1031	.0965	.0905	.0850
7	.2818	.2592	.2388	.2204	.2038	.1888	.1752	.1629	.1517	.1416	.1324	.1240	.1163	.1093
8	.3410	.3144	.2903	.2684	.2485	.2305	.2142	.1993	.1859	.1736	.1624	.1522	.1429	.1343
9	.3983	.3682	.3406	.3155	.2927	.2719	.2530	.2358	.2201	.2057	.1927	.1807	.1698	.1597
1.0	.4526	.4195	.3891	.3612	.3357	.3123	.2910	.2716	.2538	.2376	.2227	.2090	.1965	.1850
1.1	.5034	.4680	.4351	.4048	.3770	.3514	.3280	.3065	.2868	.2688	.2522	.2370	.2230	.2101
1.2	.5506	.5133	.4786	.4464	.4166	.3891	.3637	.3404	.3190	.2993	.2811	.2644	.2490	.2348
1.3	.5941	.5557	.5196	.4858	.4543	.4252	.3982	.3733	.3503	.3291	.3095	.2914	.2747	.2593
1.4	.6342	.5951	.5580	.5231	.4904	.4598	.4315	.4051	.3807	.3582	.3373	.3179	.3000	.2834
1.5	.6711	.6318	.5942	.5584	.5247	.4931	.4636	.4360	.4104	.3866	.3645	.3440	.3249	.3073
1.6	.7050	.6659	.6281	.5919	.5575	.5251	.4946	.4660	.4393	.4144	.3912	.3697	.3496	.3309
1.7	.7361	.6976	.6599	.6236	.5888	.5557	.5245	.4951	.4675	.4417	.4175	.3950	.3739	.3543
1.8	.7647	.7270	.6898	.6535	.6186	.5851	.5534	.5233	.4950	.4683	.4439	.4199	.3980	.3775
1.9	.7908	.7542	.7177	.6818	.6469	.6133	.5812	.5507	.5217	.4944	.4686	.4444	.4217	.4004
2.0	.8145	.7793	.7438	.7085	.6739	.6403	.6080	.5771	.5477	.5198	.4935	.4686	.4452	.4231
2.1	.8362	.8025	.7681	.7336	.6995	.6661	.6338	.6027	.5730	.5447	.5173	.4923	.4683	.4456
2.2	.8558	.8238	.7907	.7571	.7237	.6907	.6585	.6274	.5975	.5689	.5416	.5156	.4910	.4678
2.3	.8735	.8432	.8116	.7791	.7465	.7141	.6822	.6512	.6212	.5924	.5648	.5385	.5134	.4897
2.4	.8894	.8610	.8309	.7997	.7680	.7362	.7048	.6741	.6441	.6152	.5874	.5608	.5354	.5112
2.5	.9037	.8772	.8487	.8188	.7882	.7572	.7264	.6960	.6662	.6373	.6094	.5826	.5569	.5323
2.6	.9165	.8918	.8650	.8365	.8070	.7770	.7468	.7169	.6874	.6587	.6308	.6038	.5775	.5531
2.7	.9278	.9050	.8799	.8529	.8247	.7956	.7663	.7369	.7078	.6793	.6515	.6245	.5985	.5734
2.8	.9378	.9169	.8934	.8680	.8411	.8131	.7846	.7559	.7273	.6991	.6715	.6446	.6185	.5933
2.9	.9460	.9275	.9057	.8818	.8563	.8295	.8019	.7740	.7460	.7182	.6908	.6640	.6380	.6127
3.0	.9544	.9370	.9169	.8945	.8703	.8448	.8182	.7911	.7638	.7365	.7094	.6829	.6565	.6317
3.2	.9670	.9528	.9360	.9167	.8953	.8722	.8478	.8226	.7967	.7706	.7445	.7186	.6930	.6680
3.4	.9765	.9652	.9513	.9349	.9162	.8957	.8737	.8504	.8263	.8016	.7766	.7516	.7267	.7021
3.6	.9835	.9747	.9633	.9496	.9337	.9157	.8960	.8748	.8526	.8295	.8059	.7820	.7580	.7340
3.8	.9886	.9818	.9728	.9615	.9480	.9324	.9150	.8961	.8758	.8544	.8323	.8097	.7867	.7637
4.0	.9923	.9871	.9800	.9709	.9596	.9464	.9312	.9143	.8960	.8765	.8560	.8348	.8130	.7910
4.2	.9948	.9910	.9855	.9782	.9690	.9578	.9447	.9299	.9136	.8959	.8771	.8574	.8370	.8161
4.4	.9966	.9938	.9896	.9839	.9764	.9671	.9560	.9431	.9287	.9128	.8957	.8776	.8585	.8389
4.6	.9978	.9958	.9927	.9882	.9822	.9746	.9652	.9542	.9416	.9275	.9120	.8955	.8779	.8596
4.8	.9986	.9972	.9949	.9915	.9867	.9805	.9728	.9634	.9525	.9400	.9263	.9112	.8952	.8782
5.0	.9991	.9981	.9965	.9939	.9902	.9852	.9788	.9710	.9616	.9507	.9385	.9251	.9105	.8948

A(R,I,N) = PROB(AT LEAST ONE HIT) FOR N = 5

R I	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0026	.0025	.0022	.0020	.0018	.0016	.0015	.0013	.0012	.0011	.0010	.0010
2	.0104	.0098	.0087	.0078	.0070	.0063	.0058	.0053	.0048	.0044	.0041	.0038
3	.0228	.0214	.0191	.0171	.0154	.0139	.0126	.0115	.0106	.0097	.0089	.0083
4	.0391	.0368	.0328	.0293	.0264	.0239	.0217	.0198	.0181	.0167	.0154	.0142
5	.0584	.0550	.0490	.0439	.0395	.0358	.0325	.0297	.0272	.0250	.0231	.0213
6	.0799	.0753	.0671	.0602	.0542	.0491	.0446	.0407	.0373	.0343	.0317	.0293
7	.1028	.0969	.0865	.0776	.0699	.0633	.0576	.0526	.0482	.0444	.0409	.0379
8	.1265	.1193	.1065	.0956	.0863	.0782	.0711	.0650	.0596	.0548	.0506	.0468
9	.1505	.1420	.1269	.1140	.1029	.0933	.0850	.0777	.0712	.0656	.0605	.0560
1.0	.1744	.1647	.1473	.1325	.1197	.1086	.0989	.0905	.0830	.0764	.0706	.0654
1.1	.1982	.1872	.1677	.1510	.1365	.1239	.1130	.1034	.0949	.0874	.0807	.0748
1.2	.2217	.2096	.1880	.1694	.1533	.1393	.1270	.1163	.1068	.0984	.0910	.0843
1.3	.2450	.2318	.2081	.1877	.1700	.1546	.1412	.1293	.1188	.1095	.1013	.0935
1.4	.2580	.2537	.2282	.2061	.1868	.1700	.1553	.1424	.1309	.1207	.1117	.1036
1.5	.2908	.2756	.2482	.2244	.2036	.1855	.1696	.1555	.1431	.1320	.1222	.1133
1.6	.3135	.2973	.2681	.2427	.2205	.2010	.1839	.1688	.1554	.1435	.1328	.1233
1.7	.3360	.3189	.2880	.2610	.2374	.2167	.1984	.1822	.1679	.1551	.1436	.1334
1.8	.3583	.3403	.3079	.2794	.2544	.2324	.2130	.1958	.1805	.1668	.1546	.1436
1.9	.3804	.3617	.3277	.2978	.2715	.2483	.2277	.2095	.1932	.1787	.1657	.1540
2.0	.4024	.3830	.3476	.3163	.2887	.2643	.2426	.2233	.2061	.1908	.1770	.1645
2.1	.4242	.4041	.3673	.3348	.3059	.2803	.2576	.2373	.2192	.2030	.1884	.1753
2.2	.4458	.4251	.3870	.3532	.3232	.2965	.2727	.2514	.2324	.2153	.2000	.1861
2.3	.4671	.4458	.4066	.3717	.3405	.3127	.2879	.2657	.2457	.2278	.2117	.1972
2.4	.4882	.4664	.4261	.3901	.3578	.3290	.3031	.2800	.2592	.2405	.2236	.2083
2.5	.5089	.4867	.4455	.4084	.3751	.3453	.3185	.2944	.2728	.2532	.2356	.2196
2.6	.5294	.5067	.4646	.4266	.3924	.3616	.3339	.3089	.2864	.2661	.2477	.2311
2.7	.5494	.5265	.4836	.4448	.4096	.3779	.3493	.3235	.3002	.2791	.2600	.2426
2.8	.5691	.5459	.5024	.4627	.4268	.3942	.3648	.3381	.3140	.2921	.2723	.2543
2.9	.5884	.5649	.5209	.4806	.4438	.4105	.3802	.3528	.3279	.3053	.2847	.2661
3.0	.6072	.5836	.5391	.4982	.4608	.4267	.3956	.3674	.3418	.3185	.2973	.2779
3.2	.6436	.6195	.5747	.5328	.4942	.4588	.4264	.3968	.3697	.3450	.3225	.3019
3.4	.6780	.6544	.6090	.5665	.5270	.4905	.4569	.4260	.3976	.3717	.3479	.3261
3.6	.7104	.6870	.6419	.5991	.5590	.5216	.4869	.4550	.4255	.3984	.3734	.3504
3.8	.7407	.7178	.6732	.6304	.5900	.5520	.5165	.4836	.4531	.4249	.3989	.3749
4.0	.7688	.7467	.7023	.6605	.6199	.5815	.5455	.5118	.4805	.4514	.4244	.3994
4.2	.7949	.7735	.7309	.6891	.6487	.6102	.5738	.5395	.5075	.4775	.4497	.4238
4.4	.8188	.7983	.7571	.7162	.6763	.6379	.6013	.5666	.5340	.5034	.4748	.4481
4.6	.8406	.8212	.7816	.7418	.7026	.6645	.6279	.5930	.5599	.5288	.4996	.4722
4.8	.8605	.8422	.8044	.7659	.7276	.6900	.6535	.6186	.5853	.5537	.5240	.4960
5.0	.8784	.8613	.8255	.7885	.7512	.7143	.6782	.6434	.6100	.5782	.5480	.5195



A(R, I, N) = PROB(AT LEAST ONE HIT) FOR N = 6

R I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
.1	.0092	.0084	.0077	.0070	.0065	.0060	.0055	.0051	.0047	.0044	.0041	.0038	.0036	.0034
.2	.0358	.0327	.0299	.0275	.0253	.0233	.0216	.0200	.0185	.0173	.0161	.0150	.0141	.0132
.3	.0773	.0707	.0648	.0595	.0548	.0506	.0468	.0434	.0403	.0375	.0350	.0327	.0307	.0288
.4	.1304	.1194	.1095	.1007	.0928	.0857	.0794	.0736	.0684	.0637	.0595	.0556	.0521	.0489
.5	.1909	.1751	.1608	.1481	.1366	.1263	.1170	.1086	.1010	.0942	.0879	.0823	.0771	.0724
.6	.2550	.2343	.2156	.1988	.1837	.1700	.1576	.1465	.1364	.1272	.1189	.1113	.1043	.0980
.7	.3194	.2942	.2713	.2506	.2318	.2148	.1995	.1856	.1729	.1614	.1510	.1414	.1327	.1247
.8	.3818	.3525	.3258	.3015	.2794	.2594	.2412	.2246	.2095	.1958	.1833	.1718	.1613	.1517
.9	.4407	.4080	.3780	.3506	.3255	.3027	.2819	.2629	.2455	.2297	.2152	.2019	.1898	.1786
1.0	.4953	.4599	.4273	.3972	.3696	.3442	.3211	.2999	.2804	.2627	.2464	.2314	.2176	.2050
1.1	.5455	.5081	.4733	.4410	.4113	.3839	.3586	.3355	.3142	.2946	.2766	.2601	.2449	.2308
1.2	.5912	.5525	.5162	.4823	.4507	.4215	.3946	.3697	.3467	.3256	.3061	.2881	.2715	.2562
1.3	.6330	.5935	.5561	.5210	.4881	.4574	.4290	.4026	.3782	.3556	.3347	.3154	.2975	.2810
1.4	.6711	.6314	.5934	.5574	.5234	.4916	.4620	.4343	.4086	.3848	.3626	.3421	.3231	.3054
1.5	.7059	.6663	.6282	.5916	.5570	.5243	.4937	.4649	.4382	.4132	.3899	.3683	.3482	.3295
1.6	.7376	.6986	.6606	.6239	.5889	.5556	.5241	.4946	.4668	.4409	.4167	.3940	.3729	.3533
1.7	.7665	.7295	.6909	.6544	.6191	.5855	.5535	.5232	.4947	.4679	.4428	.4193	.3973	.3768
1.8	.7929	.7560	.7192	.6830	.6479	.6140	.5817	.5509	.5218	.4943	.4685	.4442	.4214	.4000
1.9	.8168	.7814	.7455	.7100	.6751	.6413	.6088	.5777	.5481	.5201	.4936	.4686	.4451	.4229
2.0	.8386	.8047	.7700	.7353	.7009	.6673	.6348	.6035	.5736	.5451	.5181	.4925	.4684	.4456
2.1	.8582	.8250	.7927	.7590	.7253	.6921	.6597	.6284	.5983	.5695	.5421	.5160	.4913	.4680
2.2	.8759	.8455	.8137	.7811	.7482	.7156	.6836	.6524	.6222	.5932	.5655	.5390	.5139	.4900
2.3	.8917	.8632	.8330	.8017	.7698	.7379	.7063	.6754	.6453	.6162	.5882	.5615	.5360	.5117
2.4	.9059	.8794	.8508	.8208	.7900	.7589	.7279	.6974	.6675	.6384	.6104	.5834	.5576	.5329
2.5	.9185	.8939	.8670	.8385	.8089	.7788	.7485	.7184	.6888	.6599	.6318	.6048	.5788	.5538
2.6	.9297	.9070	.8819	.8549	.8266	.7974	.7679	.7384	.7092	.6806	.6526	.6255	.5994	.5742
2.7	.9396	.9188	.8954	.8699	.8429	.8149	.7863	.7575	.7288	.7005	.6727	.6457	.6195	.5942
2.8	.9483	.9293	.9076	.8837	.8581	.8313	.8037	.7756	.7475	.7196	.6921	.6652	.6391	.6137
2.9	.9559	.9386	.9186	.8963	.8722	.8465	.8199	.7927	.7653	.7379	.7108	.6841	.6580	.6327
3.0	.9625	.9469	.9286	.9078	.8851	.8607	.8352	.8089	.7822	.7554	.7287	.7023	.6764	.6512
3.2	.9732	.9607	.9455	.9277	.9078	.8861	.8628	.8385	.8135	.7880	.7623	.7367	.7114	.6865
3.4	.9812	.9713	.9589	.9440	.9268	.9076	.8868	.8646	.8413	.8174	.7930	.7685	.7439	.7196
3.6	.9870	.9793	.9694	.9570	.9424	.9258	.9073	.8873	.8660	.8437	.8208	.7975	.7739	.7504
3.8	.9911	.9853	.9774	.9674	.9552	.9409	.9247	.9069	.8876	.8671	.8458	.8239	.8015	.7788
4.0	.9940	.9897	.9836	.9756	.9655	.9534	.9394	.9236	.9064	.8878	.8681	.8476	.8265	.8050
4.2	.9961	.9929	.9882	.9819	.9737	.9636	.9516	.9379	.9225	.9058	.8879	.8689	.8492	.8289
4.4	.9974	.9952	.9917	.9867	.9801	.9718	.9617	.9498	.9364	.9215	.9052	.8879	.8696	.8506
4.6	.9984	.9967	.9942	.9904	.9851	.9783	.9699	.9598	.9481	.9349	.9204	.9046	.8878	.8702
4.8	.9990	.9978	.9960	.9931	.9890	.9835	.9766	.9680	.9580	.9465	.9335	.9200	.9040	.8878
5.0	.9994	.9986	.9972	.9951	.9919	.9876	.9819	.9748	.9662	.9562	.9448	.9321	.9183	.9034

R	I	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0032	.0030	.0027	.0024	.0021	.0019	.0018	.0016	.0015	.0013	.0012	.0012
2	1	.0124	.0117	.0104	.0093	.0084	.0076	.0069	.0063	.0057	.0053	.0049	.0045
3	1	.0270	.0254	.0226	.0203	.0183	.0165	.0150	.0137	.0125	.0115	.0106	.0098
4	1	.0460	.0433	.0386	.0345	.0311	.0281	.0256	.0233	.0214	.0196	.0181	.0167
5	1	.0681	.0641	.0571	.0512	.0461	.0417	.0380	.0346	.0317	.0292	.0269	.0249
6	1	.0922	.0859	.0775	.0695	.0626	.0557	.0516	.0471	.0431	.0397	.0366	.0339
7	1	.1174	.1107	.0988	.0886	.0799	.0724	.0659	.0602	.0552	.0507	.0468	.0433
8	1	.1429	.1348	.1204	.1082	.0976	.0885	.0805	.0736	.0675	.0621	.0573	.0530
9	1	.1683	.1589	.1421	.1277	.1153	.1046	.0953	.0871	.0799	.0735	.0679	.0629
10	1	.1933	.1826	.1635	.1471	.1329	.1207	.1100	.1006	.0923	.0850	.0785	.0727
11	1	.2179	.2059	.1846	.1662	.1504	.1366	.1246	.1140	.1047	.0965	.0891	.0826
12	1	.2420	.2289	.2054	.1852	.1677	.1525	.1391	.1274	.1171	.1079	.0997	.0924
13	1	.2657	.2515	.2260	.2040	.1849	.1683	.1536	.1408	.1294	.1194	.1104	.1023
14	1	.2890	.2738	.2464	.2227	.2021	.1840	.1682	.1542	.1419	.1309	.1211	.1123
15	1	.3121	.2959	.2667	.2414	.2192	.1998	.1828	.1677	.1544	.1425	.1319	.1224
16	1	.3349	.3178	.2869	.2600	.2364	.2157	.1974	.1813	.1670	.1542	.1428	.1326
17	1	.3575	.3396	.3071	.2786	.2536	.2316	.2122	.1950	.1797	.1661	.1539	.1429
18	1	.3800	.3612	.3271	.2972	.2709	.2476	.2271	.2088	.1926	.1781	.1651	.1534
19	1	.4022	.3827	.3471	.3158	.2882	.2637	.2421	.2228	.2056	.1902	.1765	.1641
20	1	.4242	.4040	.3671	.3345	.3056	.2799	.2572	.2369	.2188	.2025	.1880	.1749
21	1	.4459	.4251	.3869	.3531	.3230	.2962	.2724	.2511	.2321	.2150	.1996	.1858
22	1	.4674	.4460	.4067	.3716	.3404	.3125	.2877	.2654	.2455	.2276	.2114	.1969
23	1	.4886	.4667	.4263	.3901	.3578	.3289	.3030	.2798	.2590	.2403	.2234	.2081
24	1	.5094	.4871	.4457	.4086	.3752	.3453	.3184	.2943	.2726	.2531	.2354	.2195
25	1	.5300	.5072	.4650	.4269	.3926	.3617	.3339	.3089	.2864	.2660	.2476	.2310
26	1	.5501	.5271	.4841	.4451	.4099	.3781	.3494	.3235	.3002	.2790	.2599	.2426
27	1	.5699	.5466	.5029	.4632	.4271	.3944	.3649	.3382	.3140	.2922	.2723	.2543
28	1	.5893	.5657	.5215	.4810	.4442	.4108	.3804	.3529	.3280	.3053	.2848	.2661
29	1	.6082	.5845	.5398	.4988	.4612	.4270	.3959	.3676	.3419	.3186	.2973	.2780
30	1	.6266	.6029	.5578	.5162	.4781	.4432	.4114	.3824	.3559	.3319	.3100	.2899
31	1	.6451	.6204	.5741	.5315	.4926	.4572	.4254	.3964	.3709	.3479	.3260	.3051
32	1	.6621	.6383	.5929	.5505	.5113	.4752	.4421	.4117	.3840	.3586	.3354	.3141
33	1	.6796	.6558	.6094	.5669	.5276	.4914	.4582	.4288	.4011	.3757	.3525	.3312
34	1	.6966	.6728	.6264	.5839	.5446	.5084	.4752	.4458	.4181	.3927	.3695	.3482
35	1	.7136	.6898	.6434	.6009	.5616	.5254	.4922	.4628	.4351	.4097	.3865	.3652
36	1	.7306	.7068	.6604	.6179	.5786	.5424	.5092	.4798	.4521	.4267	.4035	.3822
37	1	.7476	.7238	.6774	.6349	.5956	.5594	.5262	.4968	.4691	.4437	.4205	.3992
38	1	.7646	.7408	.6944	.6519	.6126	.5764	.5432	.5138	.4861	.4607	.4375	.4162
39	1	.7816	.7578	.7114	.6689	.6296	.5934	.5592	.5298	.5021	.4767	.4535	.4322
40	1	.7986	.7748	.7284	.6859	.6466	.6104	.5772	.5478	.5201	.4947	.4715	.4502
41	1	.8156	.7918	.7454	.7029	.6636	.6274	.5942	.5648	.5371	.5117	.4885	.4672
42	1	.8326	.8088	.7624	.7200	.6807	.6445	.6113	.5819	.5542	.5288	.5056	.4843
43	1	.8496	.8258	.7794	.7370	.6977	.6615	.6283	.5989	.5712	.5458	.5226	.5013
44	1	.8666	.8428	.7964	.7540	.7147	.6785	.6453	.6159	.5882	.5628	.5396	.5183
45	1	.8836	.8598	.8134	.7710	.7317	.6955	.6623	.6329	.6052	.5798	.5566	.5353
46	1	.9006	.8768	.8304	.7880	.7487	.7125	.6795	.6491	.6214	.5960	.5728	.5515
47	1	.9176	.8938	.8474	.8050	.7657	.7295	.6965	.6661	.6384	.6130	.5902	.5689
48	1	.9346	.9108	.8644	.8220	.7827	.7465	.7135	.6831	.6554	.6300	.6072	.5859
49	1	.9516	.9278	.8814	.8390	.7997	.7635	.7305	.7001	.6724	.6470	.6242	.6029
50	1	.9686	.9448	.8984	.8560	.8167	.7805	.7475	.7171	.6894	.6640	.6412	.6199

$$A(R,T,N) = \text{PROB}(\text{AT LEAST ONE HIT}) \text{ FOR } N = 7$$

R	T	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	1	.0341	.0331	.0316	.0297	.0276	.0254	.0232	.0211	.0191	.0173	.0157	.0142	.0129	.0117
2	2	.1294	.1259	.1205	.1136	.1058	.0975	.0893	.0813	.0738	.0670	.0607	.0551	.0500	.0455
3	3	.2679	.2613	.2508	.2373	.2219	.2054	.1887	.1724	.1570	.1427	.1296	.1178	.1072	.0976
4	4	.4256	.4162	.4013	.3817	.3588	.3338	.3082	.2829	.2586	.2358	.2149	.1957	.1784	.1629
5	5	.5795	.5687	.5510	.5274	.4989	.4672	.4339	.4005	.3679	.3369	.3081	.2816	.2574	.2355
6	6	.7128	.7020	.6840	.6590	.6281	.5925	.5542	.5146	.4755	.4376	.4019	.3687	.3382	.3103
7	7	.8169	.8074	.7911	.7676	.7372	.7010	.6606	.6179	.5745	.5318	.4908	.4522	.4163	.3832
8	8	.8911	.8836	.8702	.8501	.8228	.7888	.7492	.7060	.6609	.6155	.5712	.5287	.4888	.4515
9	9	.9396	.9342	.9242	.9083	.8856	.8556	.8193	.7779	.7334	.6874	.6416	.5969	.5542	.5140
1.0	1.0	.9687	.9652	.9583	.9467	.9290	.9042	.8723	.8345	.7924	.7476	.7018	.6564	.6124	.5703
1.1	1.1	.9849	.9828	.9784	.9705	.9575	.9379	.9112	.8780	.8394	.7971	.7528	.7078	.6635	.6205
1.2	1.2	.9932	.9920	.9895	.9844	.9753	.9605	.9390	.9107	.8764	.8374	.7955	.7520	.7083	.6653
1.3	1.3	.9971	.9965	.9951	.9921	.9860	.9753	.9585	.9350	.9052	.8701	.8312	.7899	.7475	.7052
1.4	1.4	.9989	.9986	.9979	.9961	.9937	.9847	.9726	.9529	.9276	.8966	.8610	.8224	.7819	.7408
1.5	1.5	.9996	.9995	.9991	.9982	.9958	.9907	.9812	.9661	.9449	.9179	.8860	.8503	.8121	.7726
1.6	1.6	.9999	.9998	.9997	.9992	.9978	.9944	.9875	.9757	.9583	.9352	.9068	.8742	.8386	.8010
1.7	1.7	1.0000	.9999	.9999	.9996	.9988	.9966	.9917	.9828	.9687	.9490	.9242	.8948	.8618	.8265
1.8	1.8	1.0000	1.0000	1.0000	.9998	.9994	.9980	.9946	.9878	.9766	.9602	.9386	.9123	.8822	.8492
1.9	1.9	1.0000	1.0000	1.0000	.9999	.9997	.9988	.9965	.9915	.9826	.9691	.9505	.9273	.8999	.8694
2.0	2.0	1.0000	1.0000	1.0000	1.0000	.9998	.9993	.9978	.9941	.9872	.9761	.9604	.9400	.9154	.8873
2.1	2.1	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9986	.9959	.9907	.9817	.9685	.9507	.9288	.9031
2.2	2.2	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9991	.9972	.9932	.9861	.9750	.9598	.9403	.9171
2.3	2.3	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9981	.9951	.9895	.9804	.9673	.9502	.9293
2.4	2.4	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9988	.9965	.9921	.9847	.9736	.9587	.9400
2.5	2.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9976	.9941	.9881	.9788	.9658	.9492
2.6	2.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9983	.9957	.9908	.9830	.9719	.9573
2.7	2.7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9988	.9968	.9930	.9865	.9770	.9642
2.8	2.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9977	.9946	.9894	.9813	.9701
2.9	2.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9983	.9959	.9916	.9848	.9752
3.0	3.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9988	.9970	.9935	.9878	.9794
3.2	3.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9983	.9961	.9922	.9861
3.4	3.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9991	.9977	.9951	.9908
3.6	3.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9987	.9970	.9940
3.8	3.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9993	.9982	.9961
4.0	4.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9989	.9976
4.2	4.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994	.9985
4.4	4.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9991
4.6	4.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9995
4.8	4.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9997
5.0	5.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0107	.0097	.0089	.0082	.0075	.0069	.0064	.0059	.0055	.0051	.0048	.0045	.0042	.0039
2	.0415	.0379	.0347	.0319	.0293	.0270	.0250	.0232	.0215	.0200	.0187	.0175	.0163	.0153
3	.0891	.0815	.0747	.0686	.0632	.0583	.0540	.0500	.0465	.0433	.0404	.0378	.0354	.0332
4	.1489	.1364	.1252	.1151	.1061	.0980	.0907	.0842	.0783	.0729	.0681	.0637	.0596	.0560
5	.2157	.1979	.1819	.1676	.1547	.1430	.1325	.1231	.1145	.1067	.0997	.0933	.0874	.0821
6	.2849	.2620	.2413	.2226	.2057	.1905	.1767	.1643	.1530	.1427	.1334	.1249	.1172	.1101
7	.3523	.3253	.3002	.2775	.2569	.2383	.2213	.2060	.1920	.1793	.1678	.1572	.1475	.1387
8	.4172	.3856	.3568	.3305	.3066	.2848	.2649	.2469	.2304	.2154	.2017	.1892	.1777	.1672
9	.4766	.4419	.4099	.3806	.3537	.3292	.3068	.2863	.2676	.2504	.2347	.2204	.2072	.1950
1.0	.5306	.4936	.4592	.4274	.3981	.3712	.3465	.3239	.3031	.2841	.2666	.2505	.2357	.2221
1.1	.5795	.5409	.5046	.4710	.4397	.4109	.3843	.3598	.3372	.3164	.2973	.2797	.2634	.2484
1.2	.6237	.5841	.5466	.5115	.4788	.4483	.4201	.3940	.3698	.3475	.3269	.3079	.2903	.2741
1.3	.6637	.6237	.5855	.5494	.5155	.4837	.4542	.4267	.4012	.3776	.3557	.3354	.3166	.2991
1.4	.6999	.6600	.6215	.5848	.5501	.5174	.4868	.4582	.4315	.4067	.3836	.3621	.3422	.3237
1.5	.7327	.6933	.6550	.6181	.5828	.5495	.5180	.4885	.4608	.4350	.4108	.3884	.3674	.3479
1.6	.7626	.7241	.6861	.6493	.6138	.5800	.5480	.5177	.4892	.4625	.4375	.4140	.3922	.3717
1.7	.7897	.7523	.7151	.6786	.6432	.6092	.5767	.5459	.5168	.4893	.4635	.4392	.4165	.3952
1.8	.8142	.7783	.7420	.7061	.6710	.6370	.6043	.5731	.5435	.5154	.4889	.4640	.4405	.4185
1.9	.8354	.8021	.7670	.7319	.6973	.6634	.6307	.5993	.5693	.5408	.5138	.4882	.4641	.4414
2.0	.8565	.8238	.7901	.7560	.7220	.6886	.6560	.6246	.5944	.5655	.5380	.5119	.4873	.4639
2.1	.8745	.8437	.8115	.7785	.7454	.7125	.6802	.6488	.6186	.5895	.5617	.5352	.5100	.4862
2.2	.8907	.8618	.8312	.7995	.7673	.7351	.7033	.6721	.6419	.6127	.5847	.5579	.5323	.5080
2.3	.9051	.8781	.8492	.8189	.7878	.7564	.7252	.6944	.6643	.6352	.6070	.5800	.5541	.5295
2.4	.9179	.8929	.8657	.8369	.8070	.7765	.7460	.7157	.6859	.6569	.6287	.6016	.5755	.5505
2.5	.9292	.9062	.8808	.8535	.8248	.7954	.7657	.7360	.7066	.6778	.6497	.6225	.5963	.5711
2.6	.9392	.9181	.8945	.8687	.8414	.8132	.7843	.7553	.7264	.6979	.6700	.6429	.6166	.5912
2.7	.9480	.9288	.9069	.8827	.8568	.8297	.8018	.7736	.7453	.7172	.6896	.6625	.6363	.6109
2.8	.9557	.9383	.9180	.8955	.8710	.8452	.8183	.7909	.7632	.7357	.7084	.6816	.6554	.6300
2.9	.9624	.9466	.9281	.9071	.8841	.8595	.8338	.8073	.7803	.7533	.7265	.7000	.6740	.6486
3.0	.9682	.9541	.9371	.9177	.8961	.8728	.8482	.8227	.7966	.7702	.7438	.7177	.6919	.6667
3.2	.9775	.9603	.9523	.9359	.9171	.8965	.8742	.8507	.8264	.8015	.7763	.7510	.7259	.7012
3.4	.9844	.9756	.9643	.9506	.9346	.9165	.8966	.8753	.8529	.8296	.8058	.7817	.7575	.7334
3.6	.9893	.9826	.9736	.9624	.9489	.9333	.9158	.8966	.8762	.8547	.8324	.8096	.7864	.7632
3.8	.9928	.9877	.9807	.9716	.9604	.9471	.9319	.9150	.8965	.8769	.8562	.8348	.8129	.7907
4.0	.9952	.9915	.9861	.9789	.9697	.9585	.9454	.9306	.9142	.8964	.8774	.8576	.8370	.8160
4.2	.9969	.9942	.9901	.9844	.9770	.9677	.9566	.9438	.9293	.9133	.8961	.8778	.8587	.8389
4.4	.9980	.9961	.9930	.9887	.9827	.9751	.9658	.9548	.9421	.9280	.9125	.8958	.8781	.8597
4.6	.9987	.9974	.9952	.9918	.9872	.9810	.9733	.9639	.9530	.9405	.9267	.9116	.8955	.8784
4.8	.9992	.9983	.9967	.9942	.9906	.9856	.9793	.9715	.9621	.9512	.9390	.9255	.9108	.8951
5.0	.9995	.9989	.9978	.9959	.9931	.9892	.9841	.9776	.9696	.9603	.9495	.9375	.9243	.9100

A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 7

R T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0037	.0035	.0031	.0028	.0025	.0023	.0020	.0019	.0017	.0016	.0014	.0013
2	.0144	.0136	.0121	.0108	.0097	.0088	.0080	.0073	.0067	.0061	.0057	.0052
3	.0312	.0294	.0261	.0234	.0211	.0191	.0173	.0158	.0145	.0133	.0123	.0113
4	.0526	.0496	.0441	.0395	.0356	.0322	.0293	.0267	.0245	.0225	.0207	.0192
5	.0772	.0727	.0648	.0581	.0524	.0474	.0431	.0393	.0360	.0331	.0305	.0283
6	.1036	.0976	.0871	.0781	.0704	.0637	.0580	.0529	.0485	.0446	.0412	.0381
7	.1306	.1231	.1099	.0987	.0890	.0806	.0734	.0670	.0615	.0565	.0522	.0483
8	.1575	.1486	.1328	.1193	.1077	.0976	.0889	.0812	.0745	.0686	.0633	.0586
9	.1839	.1736	.1553	.1397	.1262	.1145	.1043	.0954	.0875	.0806	.0744	.0689
1.0	.2096	.1980	.1774	.1597	.1444	.1311	.1195	.1093	.1004	.0924	.0854	.0791
1.1	.2346	.2218	.1990	.1793	.1623	.1475	.1345	.1231	.1131	.1042	.0963	.0893
1.2	.2590	.2451	.2202	.1986	.1799	.1637	.1494	.1369	.1258	.1160	.1072	.0994
1.3	.2830	.2679	.2410	.2177	.1974	.1797	.1642	.1505	.1384	.1277	.1181	.1095
1.4	.3065	.2905	.2617	.2367	.2149	.1958	.1790	.1642	.1511	.1395	.1291	.1197
1.5	.3297	.3127	.2822	.2555	.2323	.2118	.1938	.1780	.1639	.1513	.1401	.1300
1.6	.3526	.3348	.3026	.2744	.2497	.2279	.2087	.1918	.1767	.1633	.1512	.1404
1.7	.3753	.3567	.3228	.2932	.2671	.2441	.2237	.2057	.1897	.1753	.1625	.1510
1.8	.3978	.3783	.3430	.3119	.2845	.2603	.2388	.2197	.2027	.1875	.1739	.1617
1.9	.4200	.3998	.3631	.3307	.3020	.2766	.2540	.2339	.2160	.1999	.1855	.1725
2.0	.4419	.4211	.3831	.3494	.3195	.2929	.2693	.2482	.2293	.2124	.1972	.1835
2.1	.4636	.4422	.4030	.3681	.3370	.3093	.2846	.2625	.2428	.2250	.2090	.1946
2.2	.4849	.4631	.4228	.3867	.3545	.3258	.3000	.2770	.2563	.2377	.2210	.2058
2.3	.5060	.4836	.4423	.4053	.3720	.3422	.3155	.2915	.2700	.2506	.2331	.2172
2.4	.5267	.5039	.4617	.4237	.3895	.3587	.3310	.3062	.2838	.2635	.2453	.2287
2.5	.5470	.5239	.4809	.4420	.4068	.3752	.3466	.3208	.2976	.2766	.2576	.2403
2.6	.5669	.5435	.4999	.4601	.4241	.3916	.3622	.3356	.3115	.2897	.2700	.2521
2.7	.5864	.5628	.5186	.4781	.4413	.4080	.3777	.3503	.3255	.3029	.2825	.2635
2.8	.6054	.5817	.5370	.4959	.4584	.4243	.3932	.3651	.3395	.3162	.2951	.2758
2.9	.6240	.6002	.5551	.5135	.4754	.4405	.4087	.3798	.3535	.3295	.3077	.2878
3.0	.6421	.6183	.5729	.5309	.4921	.4566	.4242	.3946	.3676	.3429	.3204	.2999
3.2	.6768	.6531	.6075	.5648	.5251	.4885	.4549	.4240	.3956	.3697	.3459	.3242
3.4	.7095	.6860	.6406	.5976	.5573	.5198	.4851	.4531	.4236	.3965	.3716	.3486
3.6	.7400	.7171	.6722	.6292	.5885	.5504	.5149	.4819	.4514	.4232	.3972	.3732
3.8	.7684	.7461	.7020	.6594	.6187	.5802	.5440	.5103	.4789	.4497	.4227	.3977
4.0	.7946	.7731	.7302	.6882	.6477	.6090	.5725	.5381	.5060	.4760	.4481	.4222
4.2	.8187	.7981	.7566	.7155	.6754	.6368	.6001	.5653	.5326	.5020	.4733	.4466
4.4	.8400	.8211	.7813	.7413	.7018	.6636	.6268	.5918	.5587	.5275	.4982	.4708
4.6	.8606	.8422	.8042	.7655	.7270	.6892	.6526	.6175	.5842	.5525	.5227	.4947
4.8	.8786	.8613	.8253	.7882	.7507	.7136	.6774	.6424	.6089	.5770	.5468	.5183
5.0	.8947	.8787	.8443	.8093	.7730	.7368	.7012	.6665	.6330	.6009	.5704	.5415





A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 8

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0122	.0111	.0102	.0093	.0086	.0079	.0073	.0068	.0063	.0059	.0055	.0051	.0048	.0045
2	.0471	.0431	.0394	.0362	.0333	.0307	.0284	.0263	.0245	.0228	.0212	.0199	.0186	.0174
3	.1006	.0920	.0843	.0775	.0714	.0659	.0610	.0565	.0525	.0489	.0456	.0427	.0400	.0375
4	.1666	.1526	.1401	.1289	.1189	.1098	.1017	.0944	.0877	.0818	.0763	.0714	.0669	.0628
5	.2390	.2194	.2018	.1859	.1716	.1588	.1472	.1367	.1272	.1186	.1108	.1037	.0972	.0913
6	.3123	.2874	.2648	.2445	.2261	.2094	.1944	.1807	.1683	.1571	.1469	.1376	.1290	.1213
7	.3827	.3532	.3262	.3018	.2795	.2594	.2411	.2244	.2093	.1955	.1830	.1715	.1610	.1514
8	.4480	.4146	.3843	.3560	.3305	.3072	.2860	.2666	.2490	.2329	.2181	.2047	.1923	.1809
9	.5071	.4709	.4373	.4065	.3782	.3522	.3285	.3067	.2868	.2686	.2519	.2366	.2225	.2095
1.0	.5602	.5219	.4862	.4531	.4225	.3943	.3684	.3446	.3227	.3026	.2841	.2671	.2515	.2370
1.1	.6077	.5681	.5309	.4961	.4638	.4338	.4060	.3805	.3569	.3351	.3150	.2965	.2794	.2636
1.2	.6503	.6101	.5719	.5359	.5022	.4708	.4416	.4145	.3894	.3662	.3447	.3249	.3065	.2894
1.3	.6885	.6483	.6096	.5729	.5383	.5057	.4754	.4470	.4207	.3962	.3734	.3523	.3328	.3146
1.4	.7230	.6832	.6445	.6074	.5722	.5389	.5075	.4782	.4507	.4252	.4013	.3791	.3585	.3393
1.5	.7542	.7151	.6768	.6397	.6042	.5703	.5383	.5081	.4798	.4533	.4285	.4053	.3837	.3635
1.6	.7824	.7445	.7068	.6700	.6344	.6002	.5677	.5369	.5079	.4806	.4549	.4309	.4084	.3873
1.7	.8079	.7713	.7346	.6983	.6629	.6287	.5959	.5647	.5351	.5071	.4808	.4560	.4327	.4108
1.8	.8310	.7950	.7604	.7248	.6898	.6558	.6229	.5915	.5615	.5330	.5060	.4806	.4566	.4340
1.9	.8518	.8185	.7842	.7496	.7152	.6815	.6488	.6172	.5869	.5580	.5306	.5046	.4800	.4568
2.0	.8704	.8390	.8062	.7727	.7391	.7059	.6734	.6419	.6115	.5824	.5546	.5281	.5030	.4793
2.1	.8871	.8576	.8264	.7942	.7616	.7290	.6969	.6656	.6352	.6060	.5779	.5511	.5256	.5014
2.2	.9020	.8745	.8450	.8141	.7826	.7508	.7193	.6883	.6581	.6288	.6006	.5735	.5477	.5230
2.3	.9153	.8897	.8619	.8326	.8022	.7714	.7405	.7100	.6800	.6508	.6226	.5954	.5693	.5443
2.4	.9270	.9034	.8774	.8496	.8205	.7907	.7606	.7306	.7010	.6720	.6438	.6166	.5903	.5651
2.5	.9373	.9157	.8915	.8652	.8375	.8088	.7796	.7502	.7211	.6924	.6644	.6372	.6108	.5855
2.6	.9464	.9267	.9042	.8796	.8532	.8257	.7975	.7689	.7403	.7120	.6842	.6571	.6308	.6053
2.7	.9543	.9364	.9157	.8927	.8678	.8415	.8143	.7865	.7586	.7308	.7033	.6764	.6501	.6247
2.8	.9612	.9451	.9261	.9046	.8812	.8562	.8300	.8032	.7760	.7487	.7217	.6950	.6689	.6435
2.9	.9672	.9527	.9353	.9155	.8935	.8698	.8448	.8189	.7925	.7659	.7393	.7130	.6871	.6617
3.0	.9724	.9594	.9436	.9253	.9047	.8824	.8585	.8337	.8081	.7822	.7561	.7302	.7046	.6795
3.2	.9807	.9704	.9575	.9421	.9244	.9046	.8832	.8605	.8368	.8124	.7876	.7627	.7378	.7132
3.4	.9866	.9787	.9684	.9556	.9406	.9234	.9044	.8839	.8621	.8394	.8161	.7924	.7685	.7446
3.6	.9909	.9849	.9768	.9664	.9538	.9390	.9244	.9041	.8843	.8647	.8417	.8193	.7966	.7737
3.8	.9939	.9895	.9831	.9748	.9644	.9519	.9375	.9214	.9036	.8846	.8646	.8437	.8222	.8004
4.0	.9960	.9927	.9879	.9813	.9729	.9624	.9501	.9360	.9203	.9032	.8848	.8655	.8454	.8248
4.2	.9974	.9951	.9915	.9863	.9795	.9709	.9605	.9484	.9345	.9192	.9026	.8849	.8663	.8470
4.4	.9983	.9967	.9940	.9901	.9847	.9777	.9690	.9586	.9466	.9331	.9182	.9021	.8850	.8670
4.6	.9990	.9978	.9959	.9929	.9887	.9831	.9759	.9671	.9568	.9449	.9317	.9172	.9015	.8850
4.8	.9994	.9986	.9972	.9950	.9917	.9872	.9814	.9741	.9653	.9550	.9433	.9303	.9162	.9010
5.0	.9996	.9991	.9981	.9965	.9940	.9905	.9858	.9797	.9723	.9634	.9532	.9417	.9290	.9152

R	I	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0042	.0040	.0035	.0032	.0028	.0026	.0023	.0021	.0020	.0018	.0017	.0015
2	1	.0164	.0154	.0137	.0123	.0111	.0100	.0091	.0083	.0076	.0070	.0064	.0059
3	1	.0352	.0332	.0295	.0264	.0238	.0215	.0196	.0179	.0164	.0150	.0139	.0128
4	1	.0590	.0556	.0495	.0444	.0399	.0361	.0329	.0300	.0275	.0252	.0233	.0215
5	1	.0859	.0809	.0721	.0646	.0582	.0527	.0479	.0438	.0401	.0369	.0340	.0315
6	1	.1141	.1076	.0960	.0861	.0776	.0703	.0639	.0584	.0535	.0492	.0454	.0420
7	1	.1426	.1345	.1201	.1078	.0973	.0882	.0802	.0733	.0672	.0618	.0571	.0528
8	1	.1705	.1609	.1439	.1293	.1167	.1059	.0964	.0881	.0808	.0744	.0687	.0636
9	1	.1976	.1866	.1670	.1503	.1358	.1232	.1123	.1027	.0943	.0868	.0802	.0742
10	1	.2237	.2114	.1895	.1707	.1544	.1402	.1279	.1170	.1075	.0990	.0915	.0847
11	1	.2490	.2355	.2114	.1906	.1726	.1569	.1432	.1311	.1205	.1110	.1026	.0951
12	1	.2737	.2590	.2328	.2102	.1905	.1733	.1583	.1451	.1334	.1230	.1137	.1054
13	1	.2977	.2821	.2539	.2295	.2082	.1896	.1733	.1589	.1462	.1349	.1248	.1158
14	1	.3214	.3047	.2747	.2486	.2259	.2059	.1883	.1728	.1591	.1469	.1359	.1262
15	1	.3447	.3271	.2954	.2677	.2434	.2221	.2034	.1868	.1720	.1589	.1471	.1366
16	1	.3676	.3492	.3159	.2866	.2610	.2384	.2184	.2008	.1850	.1710	.1585	.1472
17	1	.3903	.3711	.3363	.3056	.2786	.2547	.2336	.2149	.1982	.1833	.1699	.1579
18	1	.4128	.3928	.3565	.3245	.2961	.2711	.2488	.2291	.2114	.1956	.1815	.1687
19	1	.4349	.4143	.3767	.3433	.3137	.2875	.2642	.2434	.2248	.2081	.1932	.1797
20	1	.4568	.4356	.3967	.3621	.3313	.3040	.2796	.2578	.2383	.2208	.2050	.1908
21	1	.4784	.4566	.4166	.3808	.3489	.3205	.2950	.2723	.2519	.2335	.2170	.2021
22	1	.4996	.4774	.4363	.3995	.3665	.3370	.3106	.2869	.2656	.2464	.2291	.2135
23	1	.5205	.4978	.4558	.4180	.3840	.3535	.3261	.3015	.2793	.2594	.2413	.2250
24	1	.5410	.5180	.4751	.4364	.4015	.3700	.3417	.3162	.2932	.2724	.2536	.2366
25	1	.5611	.5378	.4942	.4547	.4189	.3865	.3573	.3310	.3071	.2856	.2661	.2483
26	1	.5808	.5572	.5131	.4728	.4361	.4030	.3729	.3457	.3211	.2988	.2786	.2601
27	1	.6000	.5763	.5316	.4907	.4533	.4193	.3885	.3605	.3352	.3121	.2911	.2721
28	1	.6188	.5950	.5499	.5084	.4703	.4356	.4041	.3753	.3492	.3254	.3038	.2841
29	1	.6371	.6132	.5678	.5258	.4872	.4518	.4196	.3901	.3633	.3388	.3165	.2961
30	1	.6549	.6310	.5854	.5430	.5039	.4679	.4350	.4049	.3774	.3522	.3293	.3083
32	1	.6890	.6652	.6196	.5767	.5367	.4997	.4656	.4342	.4055	.3791	.3549	.3327
34	1	.7209	.6976	.6522	.6091	.5686	.5308	.4957	.4633	.4334	.4059	.3805	.3572
36	1	.7507	.7279	.6832	.6403	.5995	.5612	.5253	.4920	.4612	.4326	.4062	.3818
38	1	.7784	.7563	.7125	.6700	.6293	.5906	.5543	.5203	.4886	.4591	.4317	.4064
40	1	.8038	.7826	.7401	.6983	.6579	.6192	.5825	.5479	.5155	.4853	.4571	.4309
42	1	.8271	.8069	.7659	.7251	.6852	.6466	.6098	.5749	.5420	.5111	.4822	.4552
44	1	.8484	.8292	.7900	.7504	.7112	.6730	.6363	.6012	.5679	.5365	.5070	.4793
46	1	.8676	.8496	.8122	.7740	.7358	.6982	.6617	.6266	.5932	.5614	.5314	.5031
48	1	.8849	.8681	.8328	.7962	.7591	.7222	.6862	.6512	.6177	.5857	.5553	.5266
50	1	.9004	.8848	.8516	.8167	.7810	.7450	.7096	.6750	.6415	.6094	.5788	.5497



R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0137	.0125	.0114	.0105	.0097	.0089	.0082	.0076	.0071	.0066	.0061	.0057	.0054	.0050
2	.0527	.0482	.0441	.0405	.0373	.0344	.0318	.0295	.0274	.0255	.0238	.0222	.0208	.0195
3	.1117	.1022	.0938	.0862	.0794	.0733	.0678	.0629	.0584	.0544	.0508	.0475	.0445	.0417
4	.1835	.1682	.1545	.1422	.1311	.1212	.1122	.1041	.0968	.0902	.0843	.0788	.0739	.0693
5	.2607	.2395	.2204	.2031	.1876	.1736	.1609	.1495	.1392	.1298	.1213	.1135	.1064	.1000
6	.3374	.3107	.2865	.2646	.2448	.2269	.2106	.1959	.1826	.1704	.1594	.1493	.1401	.1316
7	.4095	.3782	.3496	.3236	.3000	.2785	.2590	.2412	.2250	.2103	.1969	.1846	.1733	.1630
8	.4750	.4401	.4080	.3786	.3517	.3272	.3047	.2843	.2656	.2485	.2329	.2185	.2054	.1933
9	.5335	.4960	.4612	.4291	.3996	.3724	.3475	.3247	.3038	.2847	.2671	.2509	.2360	.2224
1.0	.5854	.5461	.5094	.4753	.4436	.4144	.3875	.3627	.3399	.3188	.2995	.2817	.2653	.2502
1.1	.6314	.5912	.5532	.5176	.4844	.4535	.4249	.3984	.3739	.3513	.3305	.3112	.2934	.2769
1.2	.6724	.6319	.5932	.5566	.5222	.4901	.4601	.4322	.4064	.3824	.3602	.3396	.3205	.3028
1.3	.7091	.6688	.6299	.5928	.5576	.5245	.4935	.4644	.4374	.4122	.3888	.3670	.3468	.3280
1.4	.7421	.7024	.6638	.6265	.5908	.5571	.5252	.4953	.4672	.4410	.4166	.3938	.3725	.3527
1.5	.7718	.7332	.6950	.6579	.6221	.5880	.5555	.5249	.4960	.4690	.4436	.4199	.3977	.3770
1.6	.7986	.7613	.7240	.6873	.6516	.6173	.5845	.5533	.5239	.4961	.4699	.4454	.4224	.4008
1.7	.8228	.7870	.7507	.7147	.6794	.6451	.6122	.5807	.5508	.5224	.4956	.4704	.4466	.4243
1.8	.8446	.8104	.7755	.7403	.7056	.6716	.6387	.6070	.5767	.5479	.5206	.4948	.4704	.4474
1.9	.8641	.8318	.7983	.7642	.7302	.6967	.6639	.6323	.6018	.5727	.5450	.5186	.4937	.4701
2.0	.8816	.8512	.8193	.7864	.7533	.7204	.6880	.6565	.6260	.5967	.5687	.5420	.5165	.4924
2.1	.8972	.8688	.8385	.8071	.7750	.7428	.7109	.6797	.6493	.6199	.5917	.5647	.5385	.5144
2.2	.9111	.8847	.8562	.8261	.7952	.7639	.7327	.7018	.6717	.6424	.6141	.5868	.5608	.5359
2.3	.9233	.8990	.8722	.8437	.8141	.7838	.7533	.7230	.6931	.6640	.6357	.6084	.5821	.5570
2.4	.9342	.9118	.8868	.8599	.8316	.8024	.7727	.7431	.7137	.6848	.6566	.6293	.6029	.5776
2.5	.9437	.9232	.9001	.8748	.8478	.8198	.7911	.7621	.7333	.7047	.6768	.6495	.6231	.5977
2.6	.9520	.9334	.9120	.8884	.8629	.8360	.8083	.7802	.7520	.7239	.6962	.6691	.6428	.6173
2.7	.9592	.9424	.9228	.9007	.8767	.8511	.8245	.7973	.7697	.7422	.7149	.6881	.6618	.6363
2.8	.9655	.9504	.9325	.9120	.8894	.8652	.8397	.8134	.7866	.7597	.7328	.7063	.6803	.6549
2.9	.9710	.9574	.9411	.9222	.9011	.8781	.8538	.8285	.8026	.7763	.7500	.7239	.6981	.6728
3.0	.9756	.9636	.9488	.9314	.9117	.8901	.8670	.8427	.8177	.7921	.7664	.7407	.7153	.6902
3.2	.9830	.9736	.9616	.9471	.9302	.9113	.8906	.8685	.8453	.8214	.7970	.7724	.7478	.7233
3.4	.9884	.9811	.9716	.9596	.9454	.9290	.9107	.8908	.8697	.8475	.8246	.8013	.7777	.7540
3.6	.9922	.9867	.9792	.9696	.9577	.9437	.9278	.9101	.8910	.8706	.8494	.8274	.8051	.7824
3.8	.9948	.9908	.9850	.9773	.9675	.9558	.9420	.9265	.9094	.8910	.8714	.8510	.8300	.8084
4.0	.9966	.9937	.9893	.9833	.9754	.9656	.9539	.9404	.9253	.9087	.8909	.8721	.8524	.8322
4.2	.9978	.9957	.9925	.9878	.9815	.9734	.9636	.9520	.9388	.9241	.9080	.8908	.8726	.8537
4.4	.9986	.9972	.9948	.9912	.9862	.9797	.9715	.9617	.9502	.9373	.9229	.9073	.8906	.8730
4.6	.9991	.9981	.9964	.9937	.9899	.9846	.9779	.9696	.9598	.9485	.9357	.9217	.9065	.8904
4.8	.9995	.9988	.9976	.9956	.9926	.9885	.9830	.9761	.9678	.9580	.9468	.9343	.9206	.9058
5.0	.9997	.9992	.9984	.9969	.9947	.9914	.9870	.9814	.9744	.9660	.9562	.9451	.9329	.9195

A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 9

R T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0047	.0045	.0040	.0035	.0032	.0029	.0026	.0024	.0022	.0020	.0019	.0017
2	.0183	.0173	.0154	.0138	.0124	.0112	.0102	.0093	.0085	.0078	.0072	.0067
3	.0392	.0369	.0329	.0294	.0265	.0240	.0218	.0199	.0182	.0167	.0154	.0143
4	.0652	.0614	.0547	.0490	.0441	.0399	.0363	.0331	.0303	.0279	.0257	.0238
5	.0940	.0886	.0790	.0708	.0638	.0578	.0525	.0480	.0439	.0404	.0373	.0345
6	.1239	.1168	.1042	.0935	.0843	.0764	.0695	.0635	.0582	.0535	.0494	.0457
7	.1535	.1448	.1294	.1162	.1048	.0950	.0865	.0790	.0725	.0667	.0616	.0570
8	.1822	.1720	.1538	.1383	.1249	.1133	.1032	.0944	.0866	.0797	.0736	.0681
9	.2098	.1981	.1775	.1597	.1444	.1311	.1195	.1093	.1003	.0924	.0853	.0790
1.0	.2362	.2233	.2002	.1804	.1633	.1483	.1353	.1238	.1137	.1048	.0968	.0897
1.1	.2617	.2476	.2224	.2006	.1817	.1652	.1508	.1381	.1269	.1170	.1082	.1003
1.2	.2864	.2712	.2439	.2203	.1998	.1819	.1661	.1523	.1400	.1291	.1195	.1108
1.3	.3106	.2943	.2652	.2398	.2177	.1983	.1813	.1663	.1530	.1412	.1307	.1213
1.4	.3343	.3171	.2861	.2591	.2355	.2147	.1965	.1804	.1661	.1534	.1420	.1318
1.5	.3576	.3395	.3068	.2782	.2532	.2311	.2117	.1945	.1792	.1655	.1533	.1424
1.6	.3806	.3617	.3274	.2973	.2709	.2475	.2269	.2086	.1923	.1778	.1648	.1531
1.7	.4033	.3836	.3479	.3163	.2886	.2640	.2422	.2229	.2056	.1902	.1764	.1640
1.8	.4257	.4054	.3682	.3353	.3062	.2805	.2576	.2372	.2190	.2027	.1881	.1749
1.9	.4478	.4268	.3884	.3542	.3239	.2970	.2730	.2516	.2325	.2154	.1999	.1860
2.0	.4696	.4480	.4084	.3731	.3416	.3135	.2885	.2661	.2461	.2281	.2119	.1973
2.1	.4911	.4690	.4283	.3918	.3592	.3301	.3041	.2807	.2598	.2410	.2240	.2086
2.2	.5122	.4896	.4479	.4104	.3768	.3467	.3197	.2954	.2736	.2539	.2362	.2201
2.3	.5329	.5100	.4674	.4290	.3944	.3633	.3353	.3101	.2875	.2670	.2485	.2317
2.4	.5532	.5300	.4866	.4473	.4118	.3798	.3509	.3249	.3014	.2801	.2609	.2434
2.5	.5731	.5496	.5056	.4656	.4292	.3963	.3666	.3397	.3154	.2934	.2734	.2553
2.6	.5926	.5689	.5243	.4836	.4465	.4128	.3822	.3545	.3294	.3067	.2860	.2672
2.7	.6116	.5878	.5428	.5014	.4636	.4291	.3978	.3694	.3435	.3200	.2986	.2792
2.8	.6301	.6062	.5609	.5190	.4806	.4454	.4134	.3842	.3576	.3334	.3113	.2912
2.9	.6482	.6242	.5787	.5363	.4974	.4616	.4289	.3990	.3717	.3468	.3241	.3033
3.0	.6657	.6418	.5961	.5534	.5140	.4776	.4443	.4137	.3858	.3603	.3369	.3155
3.2	.6992	.6755	.6298	.5868	.5466	.5093	.4748	.4431	.4139	.3872	.3626	.3400
3.4	.7305	.7073	.6620	.6189	.5782	.5402	.5048	.4721	.4419	.4140	.3883	.3646
3.6	.7597	.7371	.6926	.6497	.6088	.5703	.5343	.5007	.4695	.4407	.4139	.3892
3.8	.7867	.7648	.7214	.6790	.6383	.5996	.5630	.5288	.4968	.4671	.4395	.4138
4.0	.8115	.7905	.7485	.7069	.6665	.6278	.5910	.5563	.5237	.4932	.4648	.4383
4.2	.8342	.8142	.7737	.7332	.6935	.6550	.6181	.5831	.5500	.5190	.4898	.4626
4.4	.8548	.8359	.7972	.7580	.7191	.6810	.6443	.6091	.5758	.5442	.5145	.4866
4.6	.8734	.8557	.8190	.7812	.7433	.7059	.6695	.6344	.6008	.5690	.5388	.5104
4.8	.8901	.8737	.8390	.8029	.7661	.7295	.6936	.6587	.6252	.5931	.5626	.5338
5.0	.9051	.8899	.8574	.8230	.7876	.7520	.7167	.6822	.6487	.6166	.5859	.5567

R	T	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1		.0483	.0469	.0448	.0422	.0392	.0361	.0329	.0300	.0272	.0246	.0223	.0202	.0183	.0167
2		.1796	.1749	.1676	.1582	.1474	.1361	.1247	.1137	.1034	.0938	.0851	.0772	.0702	.0639
3		.3595	.3512	.3379	.3206	.3006	.2790	.2569	.2353	.2147	.1955	.1778	.1617	.1473	.1343
4		.5471	.5364	.5192	.4961	.4685	.4380	.4060	.3740	.3430	.3137	.2865	.2615	.2388	.2182
5		.7099	.6991	.6810	.6559	.6248	.5890	.5504	.5107	.4714	.4335	.3978	.3646	.3342	.3064
6		.8317	.8225	.8065	.7833	.7530	.7165	.6755	.6320	.5876	.5438	.5018	.4622	.4254	.3915
7		.9116	.9048	.8926	.8737	.8475	.8142	.7748	.7312	.6852	.6387	.5930	.5492	.5078	.4692
8		.9579	.9536	.9453	.9317	.9112	.8833	.8483	.8076	.7630	.7164	.6695	.6236	.5795	.5378
9		.9819	.9794	.9745	.9655	.9508	.9291	.8999	.8639	.8228	.7783	.7322	.6860	.6408	.5975
1.0		.9929	.9917	.9890	.9837	.9739	.9579	.9347	.9043	.8678	.8267	.7829	.7378	.6929	.6491
1.1		.9975	.9969	.9956	.9927	.9866	.9754	.9577	.9329	.9014	.8646	.8239	.7810	.7373	.6938
1.2		.9992	.9990	.9984	.9969	.9937	.9858	.9727	.9530	.9265	.8941	.8571	.8170	.7752	.7329
1.3		.9998	.9997	.9995	.9987	.9967	.9918	.9825	.9671	.9453	.9173	.8842	.8472	.8078	.7672
1.4		.9999	.9999	.9998	.9995	.9984	.9953	.9888	.9771	.9594	.9356	.9064	.8728	.8361	.7975
1.5		1.0000	1.0000	.9999	.9998	.9992	.9974	.9928	.9841	.9700	.9500	.9246	.8943	.8605	.8242
1.6		1.0000	1.0000	1.0000	.9999	.9996	.9985	.9955	.9890	.9779	.9614	.9395	.9126	.8817	.8479
1.7		1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9972	.9925	.9839	.9704	.9516	.9280	.9000	.8688
1.8		1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9982	.9949	.9883	.9774	.9616	.9409	.9159	.8872
1.9		1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9989	.9966	.9916	.9829	.9697	.9518	.9295	.9034
2.0		1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9993	.9977	.9940	.9871	.9762	.9609	.9412	.9176
2.1		1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9985	.9957	.9903	.9814	.9684	.9512	.9300
2.2		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9990	.9970	.9928	.9856	.9746	.9596	.9408
2.3		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9994	.9979	.9947	.9889	.9797	.9668	.9501
2.4		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9986	.9961	.9915	.9839	.9728	.9581
2.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9997	.9990	.9972	.9935	.9873	.9779	.9650
2.6		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9993	.9980	.9951	.9900	.9821	.9709
2.7		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9986	.9963	.9922	.9855	.9759
2.8		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9973	.9939	.9884	.9801
2.9		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9993	.9980	.9953	.9907	.9837
3.0		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9985	.9964	.9926	.9867
3.2		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9979	.9954	.9912
3.4		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9988	.9972	.9943
3.6		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9983	.9964
3.8		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9990	.9977
4.0		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9986
4.2		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9992
4.4		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9995
4.6		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997
4.8		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
5.0		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999

A(R,I,N) = PROB(AT LEAST ONE HIT) FOR N = 10

R I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0152	.0139	.0127	.0116	.0107	.0099	.0091	.0085	.0079	.0073	.0068	.0064	.0060	.0056
2	.0582	.0532	.0488	.0448	.0412	.0380	.0352	.0326	.0303	.0282	.0263	.0246	.0230	.0216
3	.1226	.1122	.1029	.0946	.0872	.0805	.0745	.0691	.0642	.0598	.0558	.0522	.0489	.0458
4	.1998	.1832	.1683	.1549	.1429	.1320	.1223	.1135	.1056	.0984	.0919	.0860	.0806	.0756
5	.2812	.2584	.2379	.2193	.2026	.1876	.1740	.1616	.1505	.1404	.1312	.1228	.1152	.1082
6	.3604	.3321	.3065	.2832	.2621	.2430	.2257	.2100	.1958	.1828	.1710	.1602	.1503	.1413
7	.4335	.4008	.3708	.3435	.3186	.2959	.2753	.2565	.2394	.2238	.2095	.1965	.1846	.1736
8	.4989	.4627	.4294	.3988	.3707	.3451	.3216	.3001	.2805	.2626	.2461	.2311	.2172	.2045
9	.5564	.5180	.4822	.4490	.4184	.3903	.3645	.3407	.3190	.2990	.2806	.2637	.2482	.2339
1.0	.6070	.5671	.5296	.4946	.4621	.4320	.4042	.3786	.3550	.3332	.3132	.2947	.2776	.2619
1.1	.6516	.6110	.5725	.5362	.5023	.4707	.4413	.4141	.3889	.3656	.3441	.3242	.3057	.2887
1.2	.6911	.6505	.6115	.5745	.5396	.5068	.4762	.4477	.4212	.3966	.3737	.3525	.3329	.3146
1.3	.7264	.6862	.6473	.6099	.5743	.5408	.5092	.4796	.4520	.4263	.4023	.3800	.3592	.3399
1.4	.7581	.7187	.6801	.6428	.6069	.5728	.5405	.5102	.4816	.4549	.4300	.4066	.3849	.3646
1.5	.7865	.7484	.7105	.6734	.6375	.6032	.5704	.5394	.5102	.4827	.4568	.4327	.4100	.3888
1.6	.8121	.7754	.7385	.7020	.6664	.6319	.5990	.5675	.5377	.5096	.4830	.4581	.4346	.4126
1.7	.8351	.8001	.7643	.7286	.6935	.6592	.6262	.5945	.5643	.5356	.5085	.4829	.4588	.4360
1.8	.8558	.8225	.7882	.7535	.7190	.6851	.6522	.6204	.5900	.5609	.5333	.5072	.4824	.4591
1.9	.8743	.8429	.8101	.7766	.7429	.7096	.6769	.6453	.6147	.5854	.5574	.5308	.5056	.4817
2.0	.8908	.8614	.8302	.7980	.7654	.7327	.7005	.6690	.6385	.6091	.5809	.5540	.5283	.5039
2.1	.9054	.8781	.8487	.8179	.7863	.7545	.7229	.6918	.6614	.6320	.6036	.5765	.5505	.5257
2.2	.9184	.8931	.8655	.8362	.8059	.7750	.7441	.7134	.6834	.6541	.6257	.5984	.5721	.5471
2.3	.9299	.9066	.8808	.8531	.8240	.7942	.7641	.7341	.7044	.6753	.6470	.6196	.5933	.5679
2.4	.9400	.9186	.8946	.8685	.8409	.8122	.7830	.7537	.7245	.6957	.6676	.6402	.6138	.5883
2.5	.9488	.9294	.9072	.8827	.8565	.8290	.8008	.7722	.7436	.7153	.6874	.6602	.6338	.6082
2.6	.9555	.9389	.9185	.8956	.8709	.8447	.8175	.7898	.7619	.7340	.7065	.6795	.6532	.6276
2.7	.9632	.9473	.9286	.9074	.8841	.8592	.8332	.8064	.7792	.7519	.7248	.6981	.6719	.6464
2.8	.9689	.9547	.9377	.9180	.8962	.8727	.8478	.8220	.7956	.7690	.7424	.7160	.6901	.6647
2.9	.9739	.9612	.9457	.9277	.9073	.8851	.8614	.8366	.8111	.7852	.7592	.7332	.7076	.6824
3.0	.9782	.9669	.9529	.9363	.9174	.8966	.8741	.8504	.8258	.8006	.7752	.7497	.7244	.6995
3.2	.9849	.9762	.9649	.9511	.9350	.9167	.8967	.8752	.8525	.8290	.8050	.7807	.7563	.7320
3.4	.9897	.9831	.9741	.9629	.9493	.9336	.9160	.8967	.8760	.8543	.8319	.8088	.7855	.7621
3.6	.9931	.9881	.9812	.9721	.9609	.9475	.9322	.9151	.8965	.8767	.8559	.8343	.8123	.7899
3.8	.9954	.9918	.9865	.9793	.9701	.9589	.9457	.9308	.9143	.8963	.8772	.8572	.8365	.8153
4.0	.9970	.9944	.9904	.9848	.9774	.9681	.9570	.9440	.9294	.9134	.8960	.8776	.8584	.8384
4.2	.9981	.9962	.9933	.9890	.9831	.9755	.9661	.9551	.9423	.9281	.9125	.8957	.8779	.8594
4.4	.9988	.9975	.9954	.9921	.9875	.9813	.9736	.9642	.9532	.9407	.9268	.9116	.8953	.8782
4.6	.9993	.9984	.9968	.9944	.9908	.9859	.9796	.9717	.9623	.9514	.9391	.9255	.9107	.8950
4.8	.9996	.9990	.9979	.9961	.9933	.9895	.9843	.9778	.9699	.9605	.9497	.9376	.9243	.9099
5.0	.9997	.9993	.9986	.9973	.9952	.9922	.9881	.9827	.9761	.9680	.9587	.9480	.9361	.9231



R	I	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0053	.0049	.0044	.0039	.0035	.0032	.0029	.0027	.0024	.0022	.0021	.0019
2	1	.0203	.0191	.0170	.0152	.0137	.0124	.0112	.0103	.0094	.0086	.0080	.0074
3	1	.0431	.0406	.0361	.0324	.0291	.0263	.0239	.0218	.0200	.0184	.0170	.0157
4	1	.0711	.0670	.0597	.0535	.0482	.0436	.0396	.0362	.0331	.0305	.0281	.0260
5	1	.1018	.0959	.0855	.0767	.0691	.0626	.0569	.0519	.0476	.0438	.0404	.0374
6	1	.1330	.1254	.1119	.1005	.0906	.0821	.0747	.0682	.0625	.0575	.0531	.0491
7	1	.1636	.1543	.1379	.1239	.1118	.1014	.0923	.0843	.0774	.0712	.0657	.0608
8	1	.1928	.1821	.1629	.1465	.1323	.1201	.1094	.1000	.0918	.0845	.0780	.0723
9	1	.2207	.2085	.1868	.1682	.1521	.1381	.1259	.1152	.1058	.0974	.0900	.0834
1.0	1	.2473	.2339	.2098	.1891	.1712	.1556	.1419	.1300	.1194	.1100	.1017	.0942
1.1	1	.2729	.2583	.2321	.2094	.1898	.1726	.1576	.1444	.1328	.1224	.1132	.1049
1.2	1	.2977	.2820	.2538	.2293	.2080	.1894	.1731	.1587	.1460	.1347	.1246	.1156
1.3	1	.3219	.3052	.2751	.2489	.2261	.2060	.1884	.1729	.1591	.1469	.1360	.1262
1.4	1	.3457	.3280	.2961	.2683	.2440	.2226	.2037	.1871	.1723	.1591	.1474	.1368
1.5	1	.3690	.3505	.3169	.2876	.2618	.2391	.2191	.2013	.1855	.1714	.1589	.1476
1.6	1	.3920	.3727	.3376	.3067	.2796	.2556	.2344	.2156	.1988	.1839	.1704	.1584
1.7	1	.4147	.3946	.3581	.3258	.2974	.2722	.2498	.2299	.2122	.1964	.1821	.1694
1.8	1	.4371	.4163	.3784	.3449	.3151	.2887	.2653	.2444	.2257	.2090	.1940	.1804
1.9	1	.4591	.4378	.3986	.3638	.3329	.3054	.2808	.2589	.2393	.2217	.2059	.1916
2.0	1	.4808	.4589	.4186	.3827	.3506	.3220	.2964	.2735	.2530	.2346	.2180	.2030
2.1	1	.5022	.4798	.4385	.4014	.3683	.3386	.3120	.2882	.2668	.2475	.2302	.2144
2.2	1	.5231	.5003	.4581	.4201	.3859	.3552	.3277	.3029	.2807	.2606	.2424	.2260
2.3	1	.5437	.5206	.4775	.4386	.4035	.3718	.3434	.3177	.2946	.2737	.2548	.2377
2.4	1	.5639	.5404	.4967	.4569	.4209	.3884	.3591	.3326	.3086	.2869	.2673	.2495
2.5	1	.5836	.5599	.5156	.4751	.4383	.4049	.3747	.3474	.3227	.3002	.2799	.2614
2.6	1	.6029	.5790	.5342	.4930	.4555	.4214	.3904	.3623	.3367	.3136	.2925	.2733
2.7	1	.6216	.5977	.5525	.5108	.4736	.4377	.4060	.3771	.3509	.3270	.3052	.2854
2.8	1	.6399	.6160	.5704	.5283	.4855	.4540	.4215	.3919	.3650	.3404	.3180	.2975
2.9	1	.6577	.6338	.5880	.5455	.5022	.4701	.4370	.4067	.3791	.3539	.3308	.3097
3.0	1	.6750	.6511	.6053	.5625	.5227	.4861	.4524	.4215	.3932	.3673	.3436	.3219
3.2	1	.7080	.6844	.6387	.5955	.5551	.5176	.4828	.4508	.4213	.3942	.3693	.3465
3.4	1	.7388	.7157	.6705	.6273	.5866	.5484	.5128	.4798	.4492	.4211	.3951	.3711
3.6	1	.7674	.7449	.7006	.6578	.6169	.5783	.5421	.5083	.4769	.4477	.4207	.3958
3.8	1	.7938	.7722	.7290	.6868	.6461	.6073	.5706	.5362	.5041	.4741	.4462	.4203
4.0	1	.8180	.7973	.7556	.7143	.6740	.6353	.5984	.5636	.5308	.5002	.4715	.4448
4.2	1	.8401	.8205	.7804	.7402	.7006	.6622	.6253	.5902	.5570	.5250	.4965	.4690
4.4	1	.8602	.8417	.8035	.7646	.7259	.6879	.6512	.6161	.5826	.5509	.5211	.4930
4.6	1	.8783	.8610	.8248	.7874	.7497	.7125	.6762	.6411	.6079	.5755	.5453	.5167
4.8	1	.8946	.8784	.8443	.8086	.7722	.7358	.7000	.6652	.6316	.5995	.5690	.5400
5.0	1	.9090	.8941	.8622	.8283	.7933	.7579	.7228	.6884	.6550	.6229	.5921	.5628



R I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.5	2.7	2.8
.1	.0167	.0152	.0139	.0128	.0118	.0108	.0100	.0093	.0086	.0080	.0075	.0073	.0065	.0061
.2	.0637	.0582	.0533	.0490	.0451	.0416	.0385	.0357	.0331	.0308	.0288	.0269	.0252	.0236
.3	.1333	.1220	.1119	.1029	.0948	.0875	.0810	.0751	.0698	.0650	.0607	.0568	.0532	.0499
.4	.2153	.1975	.1815	.1671	.1541	.1425	.1320	.1226	.1140	.1063	.0992	.0929	.0870	.0817
.5	.3004	.2762	.2544	.2346	.2168	.2008	.1863	.1731	.1612	.1504	.1406	.1315	.1234	.1160
.6	.3816	.3519	.3249	.3004	.2782	.2580	.2397	.2231	.2080	.1943	.1818	.1703	.1599	.1503
.7	.4552	.4212	.3900	.3615	.3355	.3118	.2902	.2705	.2525	.2362	.2212	.2075	.1949	.1834
.8	.5201	.4829	.4485	.4169	.3878	.3612	.3368	.3145	.2940	.2753	.2582	.2425	.2280	.2147
.9	.5766	.5373	.5007	.4667	.4353	.4063	.3796	.3551	.3326	.3119	.2928	.2753	.2592	.2443
1.0	.6258	.5854	.5473	.5117	.4785	.4477	.4191	.3928	.3685	.3461	.3254	.3063	.2886	.2724
1.1	.6690	.6282	.5893	.5526	.5181	.4859	.4559	.4281	.4023	.3784	.3562	.3358	.3168	.2992
1.2	.7072	.6666	.6275	.5901	.5548	.5216	.4904	.4614	.4343	.4092	.3858	.3641	.3439	.3252
1.3	.7413	.7013	.6623	.6248	.5890	.5550	.5231	.4930	.4650	.4387	.4143	.3915	.3702	.3505
1.4	.7717	.7328	.6943	.6569	.6209	.5866	.5540	.5233	.4943	.4672	.4418	.4181	.3959	.3751
1.5	.7991	.7614	.7238	.6859	.6510	.6165	.5835	.5522	.5226	.4948	.4686	.4440	.4209	.3994
1.6	.8236	.7875	.7510	.7147	.6792	.6447	.6116	.5800	.5499	.5215	.4946	.4693	.4455	.4231
1.7	.8456	.8112	.7760	.7407	.7057	.6715	.6384	.6066	.5762	.5473	.5199	.4940	.4695	.4465
1.8	.8652	.8328	.7991	.7648	.7306	.6969	.6640	.6321	.6016	.5723	.5445	.5181	.4931	.4694
1.9	.8828	.8523	.8202	.7872	.7539	.7208	.6883	.6566	.6260	.5966	.5684	.5415	.5161	.4919
2.0	.8984	.8700	.8396	.8079	.7757	.7434	.7113	.6800	.6494	.6200	.5916	.5645	.5387	.5140
2.1	.9123	.8859	.8572	.8271	.7961	.7646	.7332	.7023	.6720	.6425	.6141	.5868	.5607	.5357
2.2	.9245	.9002	.8734	.8448	.8150	.7846	.7539	.7235	.6935	.6643	.6359	.6085	.5821	.5569
2.3	.9353	.9129	.8880	.8610	.8326	.8032	.7735	.7437	.7142	.6852	.6569	.6295	.6030	.5776
2.4	.9447	.9243	.9012	.8758	.8488	.8207	.7919	.7628	.7339	.7052	.6772	.6499	.6234	.5978
2.5	.9530	.9345	.9131	.8894	.8639	.8370	.8092	.7810	.7526	.7245	.6967	.6695	.6431	.6175
2.6	.9602	.9434	.9238	.9018	.8777	.8521	.8254	.7981	.7705	.7428	.7155	.6885	.6622	.6366
2.7	.9664	.9513	.9334	.9130	.8904	.8661	.8406	.8142	.7874	.7604	.7334	.7068	.6807	.6552
2.8	.9717	.9583	.9420	.9231	.9020	.8791	.8547	.8294	.8034	.7770	.7507	.7244	.6986	.6733
2.9	.9763	.9644	.9496	.9323	.9126	.8911	.8679	.8436	.8185	.7929	.7671	.7413	.7158	.6907
3.0	.9802	.9697	.9564	.9405	.9223	.9020	.8801	.8569	.8327	.8079	.7828	.7575	.7324	.7076
3.2	.9864	.9782	.9676	.9545	.9390	.9214	.9019	.8809	.8587	.8356	.8119	.7879	.7637	.7396
3.4	.9908	.9846	.9762	.9655	.9526	.9375	.9204	.9016	.8815	.8602	.8381	.8154	.7923	.7691
3.6	.9939	.9893	.9828	.9742	.9635	.9507	.9359	.9194	.9013	.8819	.8615	.8403	.8185	.7964
3.8	.9960	.9926	.9877	.9809	.9722	.9615	.9489	.9344	.9184	.9009	.8822	.8625	.8422	.8212
4.0	.9974	.9950	.9913	.9860	.9791	.9702	.9595	.9471	.9330	.9173	.9004	.8824	.8635	.8438
4.2	.9983	.9967	.9939	.9899	.9844	.9772	.9683	.9576	.9453	.9315	.9153	.8999	.8825	.8642
4.4	.9990	.9978	.9958	.9928	.9885	.9827	.9753	.9663	.9558	.9436	.9301	.9153	.8994	.8826
4.6	.9994	.9986	.9972	.9949	.9916	.9870	.9810	.9735	.9644	.9539	.9420	.9288	.9143	.8989
4.8	.9996	.9991	.9981	.9964	.9939	.9903	.9854	.9792	.9716	.9626	.9521	.9404	.9274	.9134
5.0	.9998	.9994	.9987	.9975	.9956	.9928	.9890	.9839	.9775	.9698	.9608	.9504	.9389	.9262

R T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0058	.0054	.0048	.0043	.0039	.0035	.0032	.0029	.0027	.0025	.0023	.0021
2	.0222	.0209	.0186	.0166	.0150	.0135	.0123	.0112	.0103	.0094	.0087	.0081
3	.0469	.0441	.0393	.0352	.0317	.0287	.0261	.0238	.0218	.0200	.0185	.0171
4	.0768	.0724	.0645	.0578	.0521	.0471	.0428	.0391	.0358	.0329	.0304	.0281
5	.1091	.1028	.0917	.0822	.0741	.0671	.0610	.0557	.0511	.0470	.0433	.0401
6	.1415	.1334	.1191	.1069	.0965	.0874	.0795	.0727	.0666	.0613	.0566	.0523
7	.1728	.1631	.1458	.1310	.1182	.1072	.0976	.0892	.0818	.0753	.0695	.0644
8	.2025	.1912	.1711	.1539	.1391	.1262	.1150	.1052	.0965	.0889	.0821	.0760
9	.2306	.2179	.1953	.1759	.1591	.1445	.1318	.1206	.1107	.1020	.0942	.0873
1.0	.2573	.2434	.2185	.1970	.1784	.1621	.1480	.1355	.1245	.1147	.1061	.0983
1.1	.2830	.2679	.2408	.2174	.1971	.1793	.1638	.1501	.1380	.1272	.1177	.1091
1.2	.3078	.2916	.2626	.2374	.2154	.1962	.1794	.1645	.1513	.1396	.1292	.1199
1.3	.3320	.3149	.2840	.2571	.2336	.2130	.1948	.1788	.1646	.1520	.1407	.1306
1.4	.3558	.3377	.3051	.2766	.2516	.2296	.2103	.1931	.1779	.1643	.1522	.1413
1.5	.3791	.3602	.3260	.2959	.2695	.2462	.2257	.2074	.1912	.1768	.1638	.1522
1.6	.4021	.3825	.3467	.3152	.2874	.2629	.2411	.2218	.2046	.1893	.1755	.1631
1.7	.4248	.4044	.3672	.3343	.3053	.2795	.2565	.2363	.2181	.2019	.1873	.1742
1.8	.4471	.4261	.3875	.3534	.3231	.2962	.2722	.2508	.2317	.2146	.1992	.1854
1.9	.4691	.4474	.4077	.3724	.3409	.3128	.2878	.2654	.2454	.2274	.2113	.1967
2.0	.4907	.4685	.4277	.3912	.3586	.3295	.3035	.2801	.2592	.2404	.2234	.2081
2.1	.5119	.4893	.4475	.4100	.3763	.3462	.3191	.2949	.2731	.2534	.2357	.2196
2.2	.5328	.5098	.4671	.4286	.3940	.3628	.3349	.3097	.2870	.2665	.2480	.2313
2.3	.5532	.5299	.4864	.4471	.4115	.3795	.3506	.3245	.3010	.2797	.2605	.2430
2.4	.5732	.5496	.5055	.4654	.4290	.3960	.3663	.3394	.3150	.2930	.2730	.2549
2.5	.5928	.5690	.5243	.4835	.4463	.4126	.3820	.3543	.3291	.3064	.2857	.2668
2.6	.6118	.5879	.5428	.5014	.4635	.4290	.3976	.3691	.3433	.3197	.2984	.2789
2.7	.6304	.6065	.5610	.5190	.4805	.4453	.4132	.3840	.3574	.3332	.3111	.2910
2.8	.6485	.6245	.5788	.5364	.4974	.4615	.4288	.3988	.3715	.3466	.3239	.3031
2.9	.6661	.6421	.5963	.5536	.5140	.4776	.4442	.4136	.3857	.3601	.3367	.3153
3.0	.6832	.6593	.6134	.5704	.5305	.4936	.4595	.4284	.3998	.3736	.3496	.3275
3.2	.7157	.6921	.6465	.6033	.5627	.5249	.4900	.4577	.4279	.4005	.3754	.3522
3.4	.7460	.7230	.6779	.6348	.5939	.5556	.5198	.4865	.4558	.4273	.4011	.3769
3.6	.7741	.7518	.7077	.6649	.6240	.5853	.5489	.5150	.4833	.4540	.4267	.4015
3.8	.8006	.7785	.7357	.6936	.6529	.6141	.5774	.5428	.5105	.4803	.4522	.4261
4.0	.8237	.8032	.7619	.7207	.6805	.6418	.6049	.5700	.5371	.5063	.4775	.4505
4.2	.8453	.8259	.7853	.7463	.7069	.6685	.6316	.5965	.5632	.5318	.5024	.4748
4.4	.8649	.8467	.8089	.7703	.7318	.6940	.6573	.6222	.5886	.5569	.5269	.4987
4.6	.8826	.8655	.8298	.7927	.7554	.7183	.6820	.6470	.6134	.5813	.5510	.5223
4.8	.8984	.8825	.8489	.8136	.7775	.7413	.7057	.6709	.6373	.6052	.5745	.5455
5.0	.9124	.8978	.8664	.8329	.7983	.7631	.7282	.6939	.6605	.6284	.5976	.5682



A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 12

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0182	.0166	.0152	.0139	.0128	.0118	.0109	.0101	.0094	.0087	.0082	.0075	.0071	.0067
2	.0691	.0632	.0579	.0531	.0489	.0451	.0417	.0387	.0359	.0335	.0312	.0292	.0273	.0256
3	.1436	.1315	.1206	.1109	.1022	.0944	.0874	.0810	.0753	.0702	.0655	.0612	.0574	.0538
4	.2302	.2112	.1942	.1788	.1650	.1526	.1414	.1313	.1221	.1139	.1063	.0995	.0933	.0876
5	.3185	.2930	.2699	.2491	.2303	.2133	.1979	.1840	.1714	.1599	.1495	.1400	.1313	.1233
6	.4012	.3702	.3420	.3164	.2931	.2720	.2528	.2353	.2195	.2050	.1918	.1798	.1688	.1587
7	.4749	.4398	.4075	.3780	.3510	.3263	.3039	.2834	.2646	.2475	.2319	.2175	.2045	.1924
8	.5391	.5010	.4657	.4332	.4033	.3758	.3506	.3275	.3064	.2870	.2692	.2529	.2379	.2240
9	.5944	.5546	.5172	.4825	.4504	.4207	.3933	.3681	.3449	.3235	.3039	.2858	.2691	.2537
1.0	.6423	.6016	.5631	.5269	.4931	.4616	.4325	.4055	.3806	.3576	.3364	.3168	.2986	.2819
1.1	.6843	.6434	.6042	.5671	.5322	.4995	.4690	.4405	.4143	.3898	.3672	.3462	.3268	.3088
1.2	.7213	.6807	.6415	.6039	.5683	.5347	.5031	.4736	.4461	.4205	.3966	.3745	.3539	.3347
1.3	.7542	.7145	.6755	.6379	.6019	.5677	.5354	.5050	.4765	.4499	.4250	.4018	.3801	.3600
1.4	.7836	.7450	.7068	.6694	.6333	.5989	.5660	.5350	.5057	.4782	.4524	.4283	.4057	.3846
1.5	.8099	.7727	.7355	.6987	.6628	.6282	.5951	.5636	.5338	.5056	.4791	.4541	.4307	.4088
1.6	.8334	.7980	.7619	.7259	.6905	.6560	.6228	.5910	.5608	.5321	.5049	.4793	.4552	.4325
1.7	.8545	.8209	.7862	.7512	.7164	.6823	.6492	.6173	.5868	.5577	.5301	.5039	.4791	.4558
1.8	.8733	.8416	.8085	.7747	.7407	.7072	.6744	.6425	.6119	.5825	.5545	.5278	.5026	.4787
1.9	.8901	.8604	.8289	.7964	.7635	.7306	.6982	.6666	.6350	.6065	.5782	.5512	.5255	.5011
2.0	.9050	.8773	.8476	.8166	.7847	.7527	.7209	.6896	.6591	.6296	.6012	.5739	.5479	.5231
2.1	.9181	.8925	.8647	.8351	.8045	.7735	.7423	.7115	.6813	.6519	.6234	.5960	.5697	.5446
2.2	.9297	.9062	.8801	.8522	.8229	.7929	.7626	.7324	.7025	.6733	.6449	.6175	.5910	.5657
2.3	.9399	.9184	.8942	.8678	.8400	.8111	.7817	.7521	.7228	.6939	.6657	.6382	.6117	.5862
2.4	.9488	.9292	.9058	.8821	.8557	.8281	.7997	.7709	.7421	.7137	.6857	.6584	.6318	.6062
2.5	.9565	.9388	.9182	.8952	.8702	.8439	.8165	.7886	.7605	.7325	.7049	.6778	.6514	.6257
2.6	.9632	.9473	.9284	.9070	.8836	.8585	.8323	.8053	.7780	.7506	.7234	.6965	.6703	.6447
2.7	.9690	.9547	.9376	.9178	.8958	.8721	.8470	.8211	.7945	.7678	.7410	.7146	.6885	.6630
2.8	.9740	.9613	.9457	.9275	.9070	.8846	.8608	.8358	.8102	.7841	.7579	.7319	.7061	.6809
2.9	.9783	.9670	.9529	.9362	.9172	.8962	.8735	.8497	.8249	.7996	.7741	.7485	.7231	.6981
3.0	.9819	.9719	.9593	.9441	.9264	.9068	.8854	.8626	.8388	.8143	.7895	.7644	.7395	.7147
3.2	.9876	.9800	.9699	.9573	.9424	.9253	.9064	.8859	.8641	.8414	.8180	.7942	.7702	.7462
3.4	.9917	.9859	.9780	.9678	.9554	.9408	.9242	.9059	.8862	.8653	.8436	.8211	.7983	.7753
3.6	.9945	.9902	.9841	.9760	.9658	.9534	.9391	.9231	.9054	.8864	.8664	.8455	.8240	.8021
3.8	.9964	.9933	.9887	.9823	.9740	.9637	.9516	.9376	.9219	.9048	.8865	.8672	.8471	.8265
4.0	.9977	.9955	.9920	.9871	.9805	.9720	.9618	.9497	.9360	.9208	.9042	.8865	.8679	.8486
4.2	.9985	.9970	.9945	.9907	.9855	.9786	.9701	.9598	.9479	.9345	.9197	.9035	.8865	.8685
4.4	.9991	.9980	.9952	.9934	.9893	.9838	.9768	.9681	.9579	.9462	.9330	.9185	.9030	.8864
4.6	.9994	.9987	.9974	.9953	.9922	.9878	.9821	.9749	.9662	.9561	.9445	.9315	.9175	.9023
4.8	.9997	.9992	.9983	.9967	.9944	.9910	.9864	.9804	.9731	.9644	.9543	.9428	.9305	.9164
5.0	.9998	.9995	.9989	.9978	.9960	.9933	.9897	.9848	.9787	.9713	.9626	.9525	.9412	.9288

R	T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0063	.0059	.0053	.0047	.0042	.0038	.0035	.0032	.0029	.0027	.0025	.0023
2	1	.0241	.0227	.0202	.0181	.0163	.0147	.0134	.0122	.0112	.0103	.0095	.0087
3	1	.0506	.0476	.0424	.0380	.0342	.0310	.0281	.0257	.0235	.0216	.0199	.0184
4	1	.0823	.0776	.0691	.0620	.0558	.0505	.0459	.0419	.0384	.0353	.0326	.0301
5	1	.1161	.1094	.0976	.0875	.0789	.0715	.0650	.0593	.0544	.0500	.0461	.0427
6	1	.1495	.1410	.1259	.1130	.1020	.0924	.0841	.0768	.0704	.0648	.0598	.0554
7	1	.1813	.1711	.1530	.1375	.1242	.1126	.1026	.0938	.0860	.0792	.0731	.0677
8	1	.2113	.1996	.1787	.1608	.1453	.1319	.1202	.1100	.1009	.0929	.0858	.0795
9	1	.2396	.2264	.2030	.1829	.1655	.1504	.1371	.1255	.1153	.1062	.0981	.0909
1.0	1	.2663	.2520	.2263	.2041	.1849	.1681	.1534	.1405	.1292	.1191	.1101	.1020
1.1	1	.2920	.2765	.2487	.2246	.2037	.1854	.1694	.1553	.1428	.1317	.1218	.1129
1.2	1	.3169	.3004	.2706	.2447	.2222	.2024	.1851	.1698	.1562	.1442	.1334	.1238
1.3	1	.3412	.3235	.2920	.2645	.2404	.2193	.2006	.1842	.1696	.1566	.1450	.1346
1.4	1	.3649	.3465	.3132	.2841	.2585	.2363	.2162	.1986	.1830	.1691	.1566	.1455
1.5	1	.3883	.3690	.3341	.3035	.2765	.2527	.2317	.2130	.1964	.1816	.1683	.1564
1.6	1	.4112	.3912	.3548	.3228	.2944	.2694	.2472	.2275	.2099	.1942	.1801	.1674
1.7	1	.4338	.4132	.3754	.3420	.3124	.2861	.2628	.2420	.2235	.2069	.1920	.1785
1.8	1	.4561	.4348	.3957	.3611	.3302	.3024	.2784	.2567	.2372	.2197	.2040	.1898
1.9	1	.4780	.4561	.4159	.3800	.3481	.3195	.2941	.2713	.2509	.2326	.2161	.2012
2.0	1	.4995	.4772	.4359	.3999	.3659	.3363	.3098	.2861	.2648	.2456	.2283	.2127
2.1	1	.5207	.4979	.4557	.4177	.3836	.3530	.3255	.3009	.2787	.2587	.2407	.2243
2.2	1	.5414	.5182	.4752	.4363	.4012	.3697	.3413	.3157	.2927	.2719	.2531	.2361
2.3	1	.5617	.5382	.4944	.4547	.4183	.3863	.3570	.3306	.3068	.2852	.2656	.2479
2.4	1	.5815	.5579	.5134	.4730	.4362	.4029	.3728	.3455	.3208	.2985	.2782	.2598
2.5	1	.6009	.5771	.5322	.4910	.4535	.4194	.3885	.3604	.3350	.3119	.2909	.2718
2.6	1	.6198	.5959	.5505	.5088	.4706	.4358	.4041	.3753	.3491	.3253	.3036	.2839
2.7	1	.6383	.6142	.5686	.5264	.4876	.4521	.4197	.3902	.3633	.3388	.3164	.2960
2.8	1	.6562	.6321	.5863	.5437	.5044	.4683	.4353	.4050	.3774	.3522	.3292	.3082
2.9	1	.6735	.6496	.6037	.5608	.5210	.4844	.4507	.4198	.3916	.3657	.3421	.3204
3.0	1	.6904	.6665	.6207	.5775	.5374	.5003	.4660	.4346	.4057	.3792	.3550	.3327
3.2	1	.7225	.6990	.6534	.6101	.5695	.5315	.4963	.4638	.4338	.4062	.3808	.3574
3.4	1	.7523	.7294	.6845	.6414	.6005	.5620	.5260	.4926	.4616	.4330	.4065	.3821
3.6	1	.7800	.7578	.7139	.6712	.6303	.5916	.5551	.5209	.4891	.4596	.4321	.4067
3.8	1	.8054	.7841	.7415	.6996	.6590	.6202	.5833	.5487	.5162	.4859	.4576	.4313
4.0	1	.8287	.8084	.7674	.7264	.6864	.6477	.6108	.5757	.5427	.5118	.4828	.4557
4.2	1	.8499	.8307	.7914	.7517	.7124	.6741	.6373	.6021	.5687	.5372	.5076	.4799
4.4	1	.8690	.8510	.8136	.7754	.7371	.6994	.6628	.6276	.5940	.5622	.5321	.5038
4.6	1	.8863	.8695	.8342	.7975	.7603	.7234	.6872	.6522	.6186	.5865	.5561	.5273
4.8	1	.9017	.8861	.8530	.8180	.7822	.7462	.7107	.6760	.6424	.6102	.5795	.5504
5.0	1	.9154	.9011	.8701	.8370	.8026	.7678	.7330	.6987	.6654	.6333	.6025	.5730





R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
.1	.0196	.0179	.0164	.0151	.0139	.0128	.0118	.0109	.0102	.0095	.0088	.0082	.0077	.0072
.2	.0744	.0680	.0623	.0573	.0527	.0486	.0450	.0417	.0387	.0361	.0336	.0314	.0294	.0276
.3	.1537	.1408	.1292	.1188	.1095	.1011	.0936	.0868	.0807	.0752	.0702	.0656	.0615	.0577
.4	.2445	.2244	.2063	.1901	.1755	.1623	.1504	.1397	.1300	.1212	.1132	.1059	.0993	.0932
.5	.3355	.3088	.2846	.2627	.2430	.2251	.2089	.1943	.1810	.1689	.1579	.1479	.1387	.1304
.6	.4193	.3872	.3579	.3312	.3070	.2849	.2649	.2467	.2302	.2151	.2013	.1887	.1772	.1666
.7	.4929	.4568	.4236	.3931	.3652	.3397	.3165	.2952	.2758	.2581	.2418	.2270	.2133	.2008
.8	.5561	.5174	.4813	.4480	.4173	.3891	.3632	.3394	.3176	.2976	.2793	.2624	.2469	.2326
.9	.6103	.5700	.5321	.4968	.4640	.4337	.4057	.3798	.3560	.3341	.3140	.2954	.2782	.2624
1.0	.6570	.6160	.5771	.5405	.5062	.4742	.4445	.4171	.3917	.3681	.3464	.3263	.3077	.2905
1.1	.6978	.6568	.6174	.5800	.5448	.5116	.4807	.4519	.4251	.4002	.3771	.3557	.3358	.3174
1.2	.7337	.6932	.6540	.6162	.5804	.5464	.5145	.4847	.4567	.4307	.4065	.3839	.3629	.3434
1.3	.7655	.7261	.6873	.6496	.6135	.5791	.5465	.5158	.4870	.4600	.4347	.4111	.3891	.3686
1.4	.7939	.7558	.7178	.6805	.6444	.6098	.5767	.5455	.5159	.4881	.4620	.4376	.4147	.3933
1.5	.8193	.7827	.7458	.7092	.6734	.6387	.6055	.5738	.5438	.5153	.4885	.4633	.4396	.4174
1.6	.8420	.8071	.7715	.7358	.7005	.6661	.6329	.6010	.5705	.5416	.5142	.4884	.4640	.4411
1.7	.8523	.8293	.7951	.7605	.7260	.6920	.6583	.6270	.5963	.5670	.5392	.5128	.4879	.4643
1.8	.8603	.8430	.8168	.7834	.7498	.7154	.6835	.6518	.6211	.5916	.5634	.5366	.5112	.4871
1.9	.8654	.8474	.8366	.8046	.7720	.7394	.7071	.6755	.6449	.6153	.5869	.5598	.5340	.5094
2.0	.89106	.8837	.8547	.8241	.7927	.7610	.7294	.6982	.6677	.6382	.6097	.5824	.5562	.5313
2.1	.9231	.8983	.8711	.8421	.8120	.7813	.7504	.7197	.6896	.6602	.6317	.6043	.5779	.5526
2.2	.9341	.9114	.8860	.8587	.8299	.8003	.7703	.7402	.7105	.6814	.6530	.6255	.5990	.5735
2.3	.9438	.9230	.8995	.8738	.8465	.8180	.7890	.7597	.7305	.7017	.6735	.6461	.6195	.5939
2.4	.9522	.9334	.9117	.8876	.8618	.8346	.8065	.7780	.7495	.7211	.6932	.6660	.6395	.6138
2.5	.9595	.9425	.9226	.9002	.8758	.8499	.8230	.7954	.7675	.7397	.7122	.6852	.6588	.6331
2.6	.9658	.9506	.9324	.9116	.8887	.8642	.8384	.8117	.7847	.7575	.7304	.7037	.6774	.6519
2.7	.9713	.9576	.9411	.9219	.9005	.8773	.8527	.8271	.8009	.7744	.7478	.7214	.6955	.6701
2.8	.9760	.9638	.9488	.9312	.9113	.8895	.8661	.8415	.8162	.7904	.7644	.7385	.7129	.6877
2.9	.9800	.9692	.9557	.9396	.9211	.9006	.8785	.8550	.8306	.8056	.7803	.7549	.7296	.7047
3.0	.9833	.9739	.9618	.9471	.9300	.9109	.8900	.8676	.8442	.8200	.7954	.7706	.7457	.7211
3.2	.9885	.9814	.9718	.9598	.9454	.9288	.9103	.8902	.8688	.8464	.8233	.7998	.7760	.7522
3.4	.9924	.9870	.9795	.9697	.9578	.9436	.9275	.9097	.8904	.8698	.8484	.8262	.8037	.7808
3.6	.9950	.9910	.9852	.9775	.9677	.9558	.9419	.9263	.9090	.8904	.8707	.8501	.8288	.8071
3.8	.9967	.9938	.9895	.9834	.9755	.9657	.9539	.9403	.9250	.9083	.8903	.8713	.8515	.8311
4.0	.9979	.9959	.9926	.9880	.9816	.9736	.9637	.9520	.9386	.9238	.9075	.8902	.8719	.8528
4.2	.9987	.9973	.9949	.9914	.9864	.9798	.9716	.9617	.9502	.9371	.9226	.9068	.8900	.8723
4.4	.9992	.9982	.9965	.9939	.9900	.9848	.9780	.9697	.9598	.9484	.9355	.9214	.9061	.8898
4.6	.9995	.9988	.9976	.9957	.9927	.9886	.9831	.9762	.9678	.9579	.9466	.9340	.9202	.9053
4.8	.9997	.9993	.9984	.9970	.9948	.9915	.9871	.9815	.9744	.9659	.9561	.9450	.9326	.9191
5.0	.9998	.9995	.9990	.9979	.9963	.9938	.9903	.9857	.9798	.9726	.9641	.9543	.9433	.9312

A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 13

R T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0358	.0004	.0057	.0051	.0046	.0041	.0338	.0334	.0331	.0029	.0027	.0025
2	.0260	.0244	.0217	.0195	.0175	.0158	.0144	.0131	.0120	.0111	.0102	.0094
3	.0542	.0511	.0455	.0407	.0367	.0332	.0302	.0275	.0252	.0232	.0214	.0198
4	.0877	.0826	.0736	.0660	.0594	.0538	.0489	.0446	.0409	.0376	.0347	.0321
5	.1227	.1156	.1032	.0926	.0834	.0756	.0687	.0628	.0575	.0529	.0488	.0452
6	.1569	.1480	.1322	.1187	.1071	.0971	.0884	.0807	.0740	.0681	.0629	.0582
7	.1933	.1786	.1598	.1436	.1297	.1177	.1072	.0980	.0899	.0827	.0764	.0707
8	.2195	.2073	.1857	.1671	.1511	.1372	.1250	.1144	.1050	.0967	.0893	.0827
9	.2478	.2343	.2101	.1894	.1714	.1557	.1420	.1300	.1194	.1101	.1017	.0943
1.0	.2746	.2598	.2335	.2106	.1908	.1736	.1585	.1452	.1334	.1230	.1137	.1055
1.1	.3003	.2844	.2560	.2313	.2098	.1910	.1745	.1600	.1471	.1357	.1256	.1165
1.2	.3252	.3083	.2779	.2514	.2283	.2081	.1903	.1746	.1607	.1483	.1373	.1274
1.3	.3495	.3316	.2994	.2712	.2466	.2250	.2059	.1891	.1742	.1608	.1489	.1383
1.4	.3732	.3545	.3206	.2909	.2648	.2418	.2216	.2036	.1876	.1734	.1607	.1492
1.5	.3965	.3770	.3415	.3103	.2829	.2586	.2372	.2181	.2011	.1860	.1724	.1602
1.6	.4195	.3992	.3623	.3297	.3009	.2754	.2528	.2327	.2147	.1987	.1843	.1714
1.7	.4421	.4211	.3828	.3489	.3188	.2922	.2684	.2473	.2284	.2115	.1963	.1826
1.8	.4643	.4427	.4032	.3680	.3368	.3089	.2841	.2620	.2421	.2244	.2084	.1939
1.9	.4861	.4640	.4233	.3870	.3546	.3257	.2998	.2767	.2560	.2373	.2205	.2054
2.0	.5075	.4850	.4433	.4059	.3724	.3425	.3156	.2915	.2699	.2504	.2328	.2169
2.1	.5285	.5056	.4630	.4246	.3902	.3592	.3314	.3064	.2839	.2636	.2452	.2286
2.2	.5492	.5259	.4825	.4432	.4078	.3759	.3471	.3213	.2979	.2768	.2577	.2404
2.3	.5693	.5457	.5017	.4616	.4253	.3925	.3629	.3362	.3120	.2901	.2703	.2523
2.4	.5890	.5652	.5206	.4798	.4427	.4091	.3787	.3511	.3261	.3035	.2829	.2642
2.5	.6083	.5843	.5392	.4978	.4600	.4256	.3944	.3660	.3403	.3169	.2956	.2763
2.6	.6270	.6030	.5575	.5156	.4771	.4420	.4100	.3809	.3544	.3303	.3084	.2884
2.7	.6453	.6212	.5755	.5331	.4941	.4583	.4255	.3958	.3686	.3438	.3212	.3006
2.8	.6630	.6390	.5931	.5503	.5108	.4745	.4411	.4107	.3828	.3573	.3341	.3128
2.9	.6802	.6562	.6103	.5673	.5273	.4905	.4565	.4254	.3969	.3708	.3469	.3251
3.0	.6968	.6730	.6271	.5839	.5436	.5063	.4719	.4402	.4111	.3843	.3598	.3374
3.2	.7285	.7051	.6596	.6163	.5755	.5374	.5021	.4693	.4391	.4113	.3857	.3621
3.4	.7580	.7352	.6904	.6473	.6064	.5678	.5317	.4981	.4669	.4381	.4114	.3868
3.6	.7852	.7632	.7195	.6769	.6360	.5972	.5606	.5263	.4944	.4646	.4370	.4114
3.8	.8102	.7891	.7468	.7050	.6645	.6256	.5887	.5540	.5214	.4909	.4625	.4360
4.0	.8331	.8130	.7723	.7315	.6916	.6530	.6160	.5809	.5478	.5167	.4876	.4604
4.2	.8539	.8349	.7960	.7565	.7174	.6792	.6423	.6071	.5737	.5421	.5124	.4845
4.4	.8727	.8549	.8179	.7799	.7418	.7042	.6676	.6325	.5989	.5669	.5368	.5083
4.6	.8895	.8730	.8381	.8017	.7648	.7280	.6919	.6569	.6233	.5912	.5607	.5318
4.8	.9046	.8893	.8565	.8219	.7864	.7506	.7151	.6805	.6470	.6148	.5840	.5548
5.0	.9180	.9039	.8734	.8406	.8065	.7719	.7372	.7031	.6698	.6377	.6069	.5774



A(R,I,N) = PROB(AT LEAST ONE HIT) FOR N = 14

R	I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	1	.0211	.0193	.0177	.0162	.0149	.0137	.0127	.0118	.0109	.0102	.0095	.0089	.0083	.0078
2	1	.0797	.0729	.0668	.0613	.0565	.0521	.0482	.0447	.0415	.0386	.0360	.0337	.0315	.0296
3	1	.1536	.1498	.1375	.1265	.1166	.1077	.0997	.0925	.0850	.0801	.0748	.0699	.0655	.0615
4	1	.2583	.2371	.2181	.2009	.1855	.1716	.1591	.1477	.1375	.1282	.1198	.1121	.1051	.0987
5	1	.3515	.3237	.2985	.2756	.2550	.2363	.2194	.2040	.1901	.1775	.1659	.1554	.1458	.1370
6	1	.4360	.4029	.3727	.3451	.3199	.2971	.2763	.2574	.2402	.2245	.2101	.1970	.1850	.1740
7	1	.5193	.4723	.4383	.4070	.3783	.3521	.3281	.3062	.2862	.2678	.2510	.2357	.2215	.2086
8	1	.5715	.5322	.4955	.4615	.4302	.4013	.3743	.3504	.3280	.3075	.2886	.2712	.2552	.2405
9	1	.6245	.5839	.5456	.5097	.4764	.4455	.4170	.3906	.3663	.3439	.3232	.3042	.2866	.2703
1.0	1	.6701	.6290	.5898	.5528	.5181	.4857	.4556	.4276	.4017	.3778	.3556	.3351	.3161	.2985
1.1	1	.7098	.6688	.6294	.5917	.5562	.5227	.4914	.4622	.4350	.4097	.3862	.3644	.3442	.3254
1.2	1	.7445	.7044	.6651	.6273	.5913	.5571	.5249	.4947	.4664	.4400	.4154	.3925	.3712	.3513
1.3	1	.7756	.7364	.6978	.6601	.6233	.5893	.5565	.5256	.4964	.4691	.4436	.4197	.3974	.3765
1.4	1	.8031	.7654	.7276	.6904	.6544	.6196	.5865	.5550	.5252	.4971	.4708	.4460	.4228	.4011
1.5	1	.8277	.7916	.7550	.7185	.6828	.6482	.6149	.5831	.5528	.5242	.4971	.4717	.4477	.4252
1.6	1	.8496	.8153	.7801	.7446	.7095	.6752	.6419	.6099	.5794	.5503	.5227	.4966	.4720	.4488
1.7	1	.8691	.8368	.8031	.7688	.7345	.6999	.6656	.6326	.6029	.5755	.5475	.5209	.4958	.4720
1.8	1	.8865	.8561	.8241	.7911	.7578	.7246	.6920	.6602	.6294	.5999	.5716	.5446	.5190	.4947
1.9	1	.9019	.8736	.8434	.8118	.7796	.7472	.7151	.6836	.6530	.6234	.5949	.5676	.5416	.5169
2.0	1	.9155	.8893	.8609	.8308	.7998	.7684	.7370	.7059	.6755	.6460	.6175	.5900	.5638	.5387
2.1	1	.9275	.9034	.8768	.8484	.8187	.7883	.7576	.7271	.6971	.6678	.6393	.6117	.5853	.5599
2.2	1	.9380	.9159	.8912	.8644	.8361	.8069	.7771	.7473	.7177	.6887	.6603	.6328	.6062	.5807
2.3	1	.9472	.9271	.9042	.8791	.8522	.8242	.7954	.7664	.7374	.7087	.6806	.6532	.6266	.6009
2.4	1	.9552	.9370	.9159	.8925	.8671	.8403	.8125	.7844	.7561	.7279	.7001	.6728	.6463	.6206
2.5	1	.9621	.9457	.9264	.9046	.8808	.8553	.8287	.8014	.7738	.7462	.7188	.6918	.6655	.6398
2.6	1	.9681	.9534	.9358	.9156	.8933	.8692	.8438	.8175	.7907	.7637	.7367	.7101	.6839	.6584
2.7	1	.9732	.9601	.9442	.9256	.9047	.8820	.8578	.8325	.8066	.7803	.7539	.7277	.7018	.6764
2.8	1	.9776	.9660	.9516	.9345	.9151	.8938	.8708	.8466	.8216	.7960	.7703	.7445	.7190	.6938
2.9	1	.9814	.9711	.9582	.9426	.9246	.9046	.8829	.8598	.8357	.8110	.7859	.7606	.7355	.7106
3.0	1	.9846	.9756	.9639	.9498	.9332	.9145	.8940	.8721	.8490	.8251	.8007	.7761	.7514	.7269
3.2	1	.9895	.9827	.9735	.9619	.9480	.9318	.9138	.8941	.8731	.8510	.8281	.8048	.7812	.7575
3.4	1	.9930	.9879	.9807	.9714	.9599	.9462	.9305	.9130	.8941	.8739	.8527	.8308	.8084	.7858
3.6	1	.9954	.9916	.9862	.9788	.9694	.9579	.9444	.9291	.9122	.8939	.8745	.8542	.8331	.8117
3.8	1	.9970	.9943	.9902	.9844	.9768	.9673	.9559	.9427	.9278	.9114	.8937	.8750	.8554	.8352
4.0	1	.9981	.9962	.9932	.9887	.9827	.9749	.9653	.9540	.9410	.9264	.9105	.8935	.8754	.8565
4.2	1	.9988	.9975	.9953	.9919	.9872	.9809	.9730	.9634	.9521	.9393	.9252	.9097	.8931	.8757
4.4	1	.9993	.9984	.9968	.9943	.9906	.9856	.9791	.9711	.9614	.9503	.9378	.9239	.9089	.8928
4.6	1	.9996	.9990	.9978	.9960	.9932	.9892	.9840	.9773	.9692	.9596	.9486	.9362	.9227	.9080
4.8	1	.9997	.9993	.9986	.9972	.9951	.9920	.9878	.9824	.9755	.9673	.9577	.9469	.9347	.9215
5.0	1	.9998	.9996	.9991	.9981	.9965	.9942	.9908	.9864	.9807	.9738	.9655	.9560	.9452	.9333

R	I	2.3	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0173	.0069	.0061	.0055	.0049	.0045	.0041	.0037	.0034	.0031	.0029	.0027
2	2	.0278	.0262	.0233	.0209	.0188	.0170	.0154	.0141	.0129	.0118	.0109	.0101
3	3	.0378	.0544	.0485	.0434	.0391	.0354	.0321	.0293	.0259	.0247	.0228	.0211
4	4	.0928	.0874	.0779	.0599	.0623	.0570	.0518	.0473	.0433	.0358	.0367	.0340
5	5	.1290	.1216	.1085	.0973	.0878	.0795	.0723	.0660	.0605	.0557	.0514	.0475
6	6	.1639	.1546	.1382	.1241	.1120	.1015	.0924	.0844	.0774	.0712	.0658	.0609
7	7	.1966	.1856	.1661	.1493	.1343	.1224	.1115	.1019	.0935	.0861	.0795	.0736
8	8	.2270	.2144	.1921	.1730	.1564	.1420	.1295	.1185	.1088	.1002	.0925	.0857
9	9	.2553	.2415	.2167	.1953	.1768	.1607	.1466	.1342	.1233	.1136	.1050	.0973
10	10	.2822	.2671	.2400	.2167	.1964	.1786	.1631	.1495	.1374	.1267	.1171	.1086
11	11	.3079	.2917	.2626	.2373	.2153	.1961	.1792	.1643	.1512	.1395	.1290	.1197
12	12	.3328	.3156	.2846	.2576	.2340	.2133	.1951	.1790	.1648	.1521	.1408	.1307
13	13	.3571	.3389	.3061	.2774	.2523	.2303	.2108	.1936	.1784	.1647	.1526	.1417
14	14	.3808	.3618	.3273	.2971	.2706	.2472	.2265	.2082	.1919	.1774	.1644	.1527
15	15	.4041	.3843	.3483	.3166	.2887	.2640	.2422	.2228	.2055	.1901	.1762	.1638
16	16	.4270	.4065	.3691	.3360	.3068	.2809	.2573	.2374	.2192	.2028	.1882	.1750
17	17	.4495	.4284	.3896	.3553	.3248	.2977	.2735	.2521	.2329	.2157	.2002	.1863
18	18	.4717	.4499	.4100	.3744	.3427	.3145	.2893	.2669	.2467	.2286	.2124	.1977
19	19	.4934	.4712	.4301	.3934	.3606	.3313	.3051	.2816	.2606	.2417	.2246	.2092
20	20	.5148	.4921	.4500	.4123	.3784	.3481	.3209	.2965	.2746	.2548	.2370	.2208
21	21	.5357	.5126	.4697	.4310	.3962	.3649	.3367	.3114	.2886	.2680	.2494	.2326
22	22	.5562	.5328	.4891	.4495	.4138	.3816	.3525	.3263	.3027	.2813	.2619	.2444
23	23	.5763	.5526	.5083	.4679	.4313	.3982	.3683	.3412	.3168	.2946	.2745	.2563
24	24	.5958	.5720	.5271	.4861	.4487	.4148	.3841	.3562	.3309	.3080	.2872	.2683
25	25	.6149	.5903	.5456	.5040	.4659	.4313	.3998	.3711	.3451	.3215	.3000	.2804
26	26	.6335	.6095	.5638	.5217	.4830	.4477	.4154	.3861	.3593	.3350	.3128	.2925
27	27	.6516	.6275	.5817	.5391	.4993	.4639	.4310	.4009	.3735	.3485	.3256	.3047
28	28	.6692	.6451	.5992	.5563	.5166	.4800	.4465	.4158	.3877	.3620	.3385	.3170
29	29	.6862	.6623	.6163	.5732	.5331	.4960	.4619	.4306	.4018	.3755	.3514	.3293
30	30	.7027	.6789	.6330	.5897	.5493	.5118	.4772	.4453	.4159	.3890	.3643	.3416
31	31	.7197	.6958	.6500	.6067	.5663	.5288	.4942	.4623	.4329	.4060	.3813	.3586
32	32	.7340	.7107	.6652	.6219	.5811	.5428	.5073	.4744	.4440	.4160	.3901	.3663
33	33	.7531	.7304	.6858	.6427	.6017	.5630	.5275	.4946	.4642	.4373	.4126	.3899
34	34	.7799	.7580	.7145	.6715	.6306	.5916	.5565	.5246	.4952	.4683	.4436	.4209
35	35	.8146	.7936	.7515	.7099	.6694	.6306	.5956	.5636	.5342	.5073	.4826	.4599
36	36	.8371	.8172	.7767	.7362	.6963	.6577	.6207	.5856	.5524	.5212	.4920	.4646
37	37	.8575	.8367	.8001	.7609	.7219	.6837	.6469	.6117	.5782	.5465	.5167	.4887
38	38	.8759	.8543	.8217	.7840	.7460	.7086	.6721	.6369	.6033	.5713	.5410	.5125
39	39	.8925	.8701	.8416	.8055	.7688	.7322	.6962	.6612	.6276	.5954	.5649	.5359
40	40	.9072	.8821	.8598	.8255	.7901	.7545	.7192	.6846	.6511	.6189	.5881	.5589
41	41	.9203	.8964	.8763	.8439	.8101	.7756	.7411	.7071	.6739	.6417	.6109	.5813

[illegible]

R T	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.3241	.0220	.1201	.1185	.0170	.0157	.0145	.0134	.0125	.0116	.1108	.0101	.0095	.0089
2	.0301	.0824	.0755	.1693	.0638	.1589	.0545	.0505	.0469	.0437	.0408	.0381	.0357	.0335
3	.1825	.1673	.1536	.1413	.1303	.1204	.1115	.1034	.0962	.0896	.0837	.0782	.0733	.0688
4	.2841	.2010	.2402	.2214	.2045	.1893	.1755	.1630	.1518	.1415	.1322	.1238	.1161	.1090
5	.3809	.3511	.3240	.2995	.2772	.2570	.2387	.2221	.2071	.1933	.1808	.1694	.1590	.1495
6	.4551	.4312	.3993	.3701	.3434	.3191	.2970	.2768	.2584	.2416	.2263	.2122	.1994	.1876
7	.5381	.4998	.4644	.4317	.4017	.3742	.3490	.3259	.3048	.2854	.2676	.2513	.2364	.2226
8	.5983	.5581	.5204	.4853	.4529	.4229	.3953	.3698	.3465	.3250	.3052	.2870	.2702	.2547
9	.6491	.6079	.5690	.5324	.4982	.4664	.4369	.4096	.3844	.3612	.3397	.3198	.3015	.2845
1.0	.6920	.6513	.6117	.5742	.5389	.5058	.4749	.4462	.4195	.3948	.3718	.3506	.3309	.3126
1.1	.7303	.6895	.6499	.6120	.5760	.5420	.5101	.4803	.4524	.4264	.4023	.3798	.3589	.3395
1.2	.7534	.7235	.6844	.6466	.6102	.5757	.5431	.5123	.4835	.4565	.4313	.4078	.3858	.3654
1.3	.7926	.7541	.7158	.6783	.6420	.6072	.5741	.5427	.5131	.4853	.4592	.4348	.4119	.3905
1.4	.8185	.7817	.7445	.7076	.6716	.6368	.6034	.5716	.5415	.5130	.4862	.4610	.4373	.4151
1.5	.8418	.8000	.7707	.7347	.6992	.6647	.6313	.5992	.5687	.5397	.5123	.4864	.4620	.4391
1.6	.8523	.8291	.7947	.7598	.7251	.6909	.6577	.6256	.5948	.5655	.5376	.5111	.4862	.4626
1.7	.8806	.8494	.8166	.7830	.7492	.7156	.6827	.6507	.6199	.5903	.5621	.5352	.5097	.4856
1.8	.8968	.8676	.8366	.8044	.7716	.7388	.7064	.6747	.6440	.6143	.5858	.5586	.5327	.5081
1.9	.9110	.8840	.8548	.8241	.7926	.7607	.7289	.6976	.6670	.6374	.6088	.5814	.5551	.5302
2.0	.9230	.8987	.8714	.8423	.8120	.7811	.7501	.7193	.6891	.6596	.6310	.6034	.5770	.5517
2.1	.9347	.9119	.8864	.8589	.8300	.8003	.7701	.7399	.7101	.6809	.6524	.6248	.5983	.5727
2.2	.9443	.9235	.8999	.8741	.8467	.8181	.7889	.7595	.7302	.7013	.6730	.6455	.6189	.5932
2.3	.9527	.9339	.9121	.8880	.8620	.8347	.8066	.7780	.7493	.7209	.6929	.6655	.6389	.6132
2.4	.9600	.9430	.9231	.9006	.8762	.8502	.8231	.7954	.7675	.7396	.7120	.6848	.6583	.6326
2.5	.9663	.9511	.9329	.9121	.8891	.8645	.8386	.8119	.7847	.7574	.7302	.7034	.6771	.6515
2.6	.9717	.9581	.9416	.9224	.9003	.8777	.8530	.8273	.8010	.7743	.7477	.7213	.6952	.6697
2.7	.9764	.9643	.9493	.9317	.9117	.8898	.8664	.8417	.8163	.7905	.7644	.7384	.7127	.6874
2.8	.9803	.9696	.9562	.9401	.9216	.9010	.8788	.8553	.8308	.8057	.7803	.7548	.7295	.7045
2.9	.9837	.9743	.9622	.9475	.9305	.9113	.8903	.8679	.8444	.8202	.7955	.7706	.7457	.7210
3.0	.9865	.9783	.9675	.9542	.9385	.9206	.9003	.8796	.8572	.8338	.8099	.7856	.7612	.7369
3.2	.9909	.9847	.9762	.9654	.9523	.9370	.9197	.9007	.8803	.8587	.8364	.8135	.7902	.7668
3.4	.9940	.9894	.9828	.9742	.9633	.9504	.9354	.9187	.9003	.8807	.8601	.8387	.8167	.7944
3.6	.9961	.9927	.9877	.9809	.9721	.9613	.9485	.9339	.9176	.8999	.8811	.8612	.8406	.8195
3.8	.9975	.9951	.9914	.9861	.9790	.9701	.9593	.9467	.9324	.9166	.8995	.8813	.8622	.8424
4.0	.9984	.9967	.9940	.9900	.9844	.9771	.9681	.9574	.9449	.9310	.9156	.8990	.8814	.8630
4.2	.9990	.9978	.9959	.9928	.9885	.9827	.9752	.9662	.9555	.9432	.9296	.9146	.8985	.8815
4.4	.9994	.9986	.9972	.9949	.9916	.9870	.9803	.9733	.9642	.9536	.9416	.9282	.9136	.8980
4.6	.9996	.9991	.9981	.9965	.9939	.9903	.9854	.9792	.9715	.9623	.9518	.9399	.9268	.9127
4.8	.9998	.9994	.9988	.9976	.9957	.9929	.9890	.9838	.9774	.9696	.9605	.9501	.9384	.9256
5.0	.9999	.9997	.9992	.9983	.9969	.9948	.9917	.9870	.9823	.9757	.9673	.9587	.9484	.9369

A(R,T,N) = PROBIT AT LEAST ONE HIT FOR N = 16

R T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	.0083	.0078	.0070	.0062	.0056	.0051	.0045	.0042	.0039	.0035	.0033	.0030
2	.0315	.0296	.0264	.0236	.0213	.0192	.0175	.0159	.0146	.0134	.0124	.0114
3	.0647	.0609	.0543	.0486	.0438	.0396	.0360	.0329	.0301	.0277	.0255	.0236
4	.1125	.0966	.0861	.0772	.0696	.0630	.0573	.0523	.0479	.0441	.0407	.0376
5	.1407	.1327	.1184	.1063	.0956	.0858	.0790	.0722	.0662	.0608	.0561	.0520
6	.1767	.1668	.1491	.1339	.1209	.1096	.0998	.0912	.0837	.0770	.0711	.0658
7	.2199	.1982	.1774	.1596	.1442	.1309	.1193	.1091	.1001	.0922	.0851	.0788
8	.2404	.2272	.2037	.1835	.1660	.1508	.1375	.1258	.1156	.1065	.0984	.0911
9	.2589	.2543	.2284	.2060	.1865	.1696	.1548	.1418	.1303	.1201	.1110	.1029
10	.2757	.2600	.2318	.2074	.1862	.1677	.1514	.1371	.1245	.1133	.1033	.0943
11	.3214	.3046	.2744	.2482	.2253	.2053	.1877	.1722	.1584	.1462	.1353	.1255
12	.3463	.3285	.2965	.2685	.2441	.2226	.2037	.1870	.1722	.1590	.1472	.1366
13	.3705	.3519	.3181	.2885	.2625	.2397	.2195	.2017	.1853	.1717	.1591	.1478
14	.3943	.3747	.3393	.3083	.2809	.2567	.2354	.2164	.1996	.1845	.1710	.1589
15	.4175	.3972	.3604	.3278	.2991	.2737	.2512	.2312	.2133	.1973	.1830	.1702
16	.4403	.4194	.3811	.3473	.3172	.2906	.2670	.2459	.2271	.2102	.1951	.1815
17	.4528	.4412	.4017	.3665	.3353	.3075	.2828	.2607	.2409	.2232	.2073	.1929
18	.4848	.4627	.4220	.3857	.3533	.3244	.2986	.2755	.2548	.2363	.2195	.2044
19	.5064	.4838	.4421	.4047	.3712	.3413	.3145	.2904	.2688	.2494	.2319	.2160
20	.5275	.5046	.4619	.4235	.3891	.3581	.3303	.3154	.2829	.2626	.2443	.2278
21	.5483	.5250	.4815	.4422	.4068	.3749	.3462	.3203	.2970	.2759	.2569	.2396
22	.5686	.5450	.5008	.4607	.4244	.3916	.3620	.3353	.3111	.2893	.2695	.2515
23	.5894	.5659	.5198	.4790	.4419	.4083	.3778	.3503	.3253	.3027	.2822	.2635
24	.6177	.5837	.5385	.4971	.4593	.4248	.3930	.3652	.3395	.3161	.2949	.2756
25	.6266	.6025	.5569	.5149	.4764	.4413	.4093	.3802	.3537	.3296	.3077	.2877
26	.6449	.6208	.5750	.5325	.4934	.4576	.4250	.3951	.3680	.3432	.3206	.2999
27	.6627	.6386	.5926	.5498	.5102	.4738	.4403	.4100	.3822	.3567	.3334	.3122
28	.6799	.6559	.6099	.5668	.5268	.4899	.4560	.4248	.3963	.3702	.3464	.3245
29	.6967	.6728	.6268	.5835	.5432	.5058	.4713	.4396	.4105	.3838	.3593	.3368
30	.7128	.6891	.6433	.5999	.5593	.5215	.4865	.4543	.4246	.3973	.3722	.3492
32	.7435	.7203	.6751	.6317	.5908	.5523	.5165	.4833	.4520	.4242	.3981	.3739
34	.7719	.7494	.7051	.6621	.6211	.5823	.5459	.5119	.4803	.4510	.4238	.3987
36	.7981	.7765	.7333	.6910	.6502	.6113	.5745	.5399	.5076	.4774	.4494	.4233
38	.8221	.8014	.7598	.7184	.6781	.6392	.6022	.5673	.5344	.5035	.4747	.4479
40	.8433	.8244	.7844	.7442	.7046	.6661	.6291	.5939	.5606	.5292	.4997	.4722
42	.8637	.8453	.8072	.7684	.7297	.6917	.6550	.6197	.5861	.5543	.5244	.4962
44	.8815	.8643	.8283	.7910	.7534	.7162	.6798	.6447	.6110	.5789	.5485	.5198
46	.8975	.8815	.8476	.8121	.7758	.7394	.7036	.6687	.6351	.6029	.5722	.5431
48	.9117	.8970	.8653	.8316	.7967	.7614	.7263	.6918	.6584	.6262	.5953	.5660
50	.9243	.9108	.8814	.8496	.8152	.7821	.7478	.7140	.6809	.6488	.6179	.5883



R I	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	.0853	.0829	.0792	.0746	.0694	.0639	.0584	.0532	.0482	.0437	.3396	.0359	.0326	.0296
2	.2118	.2925	.2810	.2662	.2490	.2306	.2120	.1938	.1765	.1605	.1458	.1325	.1205	.1098
3	.5515	.5409	.5235	.5003	.4724	.4415	.4092	.3768	.3455	.3158	.2883	.2630	.2401	.2194
4	.7596	.7492	.7316	.7060	.6750	.6381	.5977	.5557	.5138	.4731	.4340	.3987	.3656	.3354
5	.9322	.8847	.8712	.8507	.8226	.7874	.7464	.7116	.6550	.6083	.5629	.5197	.4792	.4417
6	.9595	.9553	.9472	.9335	.9128	.8842	.8482	.8064	.7606	.7129	.6650	.6183	.5736	.5315
7	.9373	.9854	.9814	.9738	.9605	.9400	.9110	.8759	.8344	.7893	.7423	.6951	.6489	.6046
8	.9357	.9960	.9943	.9907	.9832	.9697	.9488	.9201	.8845	.8439	.7999	.7544	.7087	.6639
9	.9493	.9991	.9985	.9969	.9930	.9847	.9701	.9480	.9187	.8832	.8435	.8006	.7566	.7126
1.0	.9499	.9998	.9996	.9991	.9971	.9922	.9823	.9658	.9422	.9120	.8765	.8372	.7958	.7534
1.1	1.0000	1.0000	.9999	.9997	.9988	.9960	.9894	.9773	.9586	.9334	.9023	.8668	.8283	.7880
1.2	1.0000	1.0000	1.0000	.9999	.9995	.9979	.9937	.9849	.9704	.9495	.9228	.8911	.8556	.8178
1.3	1.0000	1.0000	1.0000	1.0000	.9998	.9989	.9962	.9900	.9788	.9618	.9390	.9110	.8788	.8437
1.4	1.0000	1.0000	1.0000	1.0000	.9999	.9994	.9977	.9934	.9849	.9712	.9520	.9275	.8985	.8661
1.5	1.0000	1.0000	1.0000	1.0000	1.0000	.9997	.9987	.9957	.9893	.9784	.9623	.9411	.9153	.8856
1.6	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9992	.9972	.9925	.9839	.9706	.9524	.9295	.9027
1.7	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9982	.9947	.9881	.9772	.9617	.9416	.9174
1.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9997	.9988	.9954	.9912	.9824	.9693	.9518	.9302
1.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9993	.9975	.9936	.9865	.9756	.9604	.9412
2.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9983	.9953	.9897	.9806	.9677	.9507
2.1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9997	.9988	.9966	.9922	.9847	.9737	.9589
2.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9976	.9941	.9880	.9787	.9658
2.3	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9983	.9956	.9907	.9828	.9717
2.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9988	.9967	.9928	.9862	.9767
2.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9992	.9976	.9944	.9890	.9809
2.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9994	.9982	.9957	.9913	.9844
2.7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9987	.9968	.9931	.9873
2.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9991	.9976	.9946	.9897
2.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9993	.9986	.9958	.9917
3.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9995	.9986	.9967	.9933
3.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9992	.9981	.9958
3.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9989	.9974
3.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9998	.9994	.9984
3.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9996	.9990
4.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9994
4.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997
4.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998
4.6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
4.8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
5.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

A(R,I,N) = PROB(AT - EAST ONE HIT) FOR N = 18

R I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0270	.0247	.0226	.1207	.0191	.0176	.0163	.0151	.0140	.0130	.1121	.0113	.0106	.0100
2	.1002	.0917	.0840	.0772	.0711	.0656	.0607	.0563	.0523	.0487	.0454	.0424	.0398	.0373
3	.2307	.1340	.1690	.1555	.1434	.1325	.1227	.1139	.1059	.0987	.1322	.0862	.0808	.0758
4	.3079	.2831	.2607	.2404	.2221	.2057	.1908	.1773	.1651	.1540	.1439	.1347	.1263	.1187
5	.4072	.3757	.3470	.3209	.2973	.2758	.2563	.2385	.2224	.2078	.1944	.1822	.1710	.1608
6	.4423	.4560	.4226	.3920	.3641	.3386	.3153	.2940	.2746	.2569	.2407	.2258	.2122	.1997
7	.5527	.5234	.4869	.4531	.4220	.3934	.3672	.3431	.3210	.3008	.2822	.2651	.2494	.2350
8	.6209	.5800	.5415	.5057	.4723	.4415	.4130	.3867	.3625	.3402	.3196	.3007	.2832	.2671
9	.6595	.6232	.5887	.5516	.5167	.4842	.4540	.4260	.4001	.3761	.3539	.3334	.3144	.2969
1.0	.7112	.6699	.6302	.5924	.5566	.5229	.4915	.4621	.4348	.4094	.3859	.3640	.3437	.3249
1.1	.7472	.7067	.6672	.6292	.5929	.5585	.5261	.4957	.4673	.4408	.4161	.3931	.3717	.3517
1.2	.7788	.7394	.7006	.6627	.6263	.5915	.5585	.5274	.4981	.4706	.4449	.4209	.3985	.3776
1.3	.8166	.7688	.7309	.6936	.6573	.6224	.5890	.5573	.5274	.4992	.4727	.4478	.4245	.4026
1.4	.8313	.7952	.7585	.7220	.6861	.6511	.6178	.5858	.5554	.5266	.4994	.4738	.4497	.4271
1.5	.8532	.8190	.7837	.7482	.7130	.6785	.6451	.6130	.5822	.5530	.5253	.4991	.4743	.4510
1.6	.8726	.8404	.8067	.7724	.7381	.7041	.6710	.6389	.6080	.5784	.5503	.5236	.4983	.4744
1.7	.8938	.8597	.8277	.7948	.7614	.7282	.6954	.6635	.6326	.6030	.5745	.5474	.5217	.4973
1.8	.9050	.8770	.8469	.8154	.7832	.7508	.7186	.6870	.6563	.6266	.5980	.5706	.5445	.5196
1.9	.9184	.8925	.8642	.8343	.8034	.7719	.7405	.7094	.6789	.6493	.6206	.5931	.5667	.5415
2.0	.9301	.9064	.8800	.8517	.8221	.7917	.7611	.7306	.7005	.6711	.6425	.6149	.5883	.5628
2.1	.9404	.9187	.8942	.8676	.8394	.8102	.7805	.7507	.7211	.6920	.6635	.6360	.6093	.5837
2.2	.9494	.9296	.9070	.8821	.8554	.8275	.7983	.7697	.7407	.7120	.6838	.6563	.6297	.6039
2.3	.9571	.9393	.9185	.8953	.8701	.8435	.8158	.7877	.7594	.7311	.7033	.6760	.6494	.6237
2.4	.9638	.9478	.9288	.9073	.8836	.8583	.8313	.8046	.7770	.7494	.7221	.6950	.6685	.6428
2.5	.9696	.9553	.9380	.9181	.8959	.8720	.8467	.8205	.7938	.7668	.7399	.7132	.6870	.6614
2.6	.9746	.9618	.9462	.9279	.9072	.8847	.8606	.8354	.8096	.7833	.7569	.7307	.7048	.6794
2.7	.9788	.9675	.9534	.9366	.9175	.8963	.8735	.8494	.8245	.7990	.7732	.7475	.7220	.6968
2.8	.9824	.9725	.9598	.9445	.9268	.9070	.8854	.8625	.8385	.8138	.7888	.7636	.7384	.7136
2.9	.9855	.9767	.9654	.9515	.9352	.9167	.8964	.8746	.8516	.8279	.8035	.7789	.7543	.7298
3.0	.9880	.9804	.9703	.9578	.9428	.9256	.9066	.8859	.8640	.8411	.8175	.7936	.7694	.7453
3.2	.9920	.9863	.9784	.9682	.9558	.9411	.9245	.9061	.8862	.8652	.8433	.8207	.7978	.7746
3.4	.9947	.9905	.9845	.9764	.9661	.9538	.9395	.9233	.9055	.8864	.8662	.8452	.8236	.8016
3.6	.9966	.9935	.9890	.9826	.9744	.9641	.9519	.9378	.9221	.9049	.8865	.8671	.8469	.8261
3.8	.9978	.9957	.9923	.9874	.9808	.9723	.9621	.9500	.9362	.9209	.9043	.8865	.8678	.8484
4.0	.9986	.9971	.9946	.9909	.9857	.9789	.9704	.9601	.9482	.9347	.9198	.9036	.8865	.8684
4.2	.9991	.9981	.9963	.9936	.9895	.9841	.9770	.9684	.9582	.9464	.9332	.9187	.9030	.8864
4.4	.9995	.9988	.9975	.9955	.9924	.9881	.9824	.9752	.9665	.9563	.9447	.9317	.9176	.9023
4.6	.9997	.9992	.9984	.9969	.9945	.9911	.9866	.9807	.9733	.9646	.9545	.9434	.9303	.9165
4.8	.9998	.9995	.9989	.9980	.9961	.9933	.9899	.9855	.9789	.9715	.9628	.9527	.9414	.9289
5.0	.9999	.9997	.9993	.9985	.9973	.9953	.9924	.9885	.9835	.9772	.9697	.9610	.9510	.9398

R	I	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0194	.0088	.0078	.0070	.0063	.0057	.0052	.0047	.0043	.0040	.0037	.0034
2	1	.0351	.0330	.0294	.0263	.0237	.0214	.0195	.0177	.0163	.0149	.0138	.0127
3	1	.0713	.0671	.0598	.0536	.0483	.0437	.0397	.0362	.0332	.0305	.0281	.0260
4	1	.1117	.1052	.0938	.0841	.0758	.0687	.0624	.0570	.0522	.0480	.0443	.0410
5	1	.1514	.1427	.1275	.1144	.1032	.0935	.0851	.0777	.0713	.0656	.0605	.0560
6	1	.1932	.1776	.1588	.1427	.1289	.1169	.1064	.0973	.0893	.0822	.0758	.0702
7	1	.2216	.2094	.1875	.1687	.1525	.1384	.1262	.1154	.1060	.0976	.0901	.0835
8	1	.2522	.2385	.2139	.1927	.1744	.1585	.1446	.1323	.1215	.1120	.1035	.0959
9	1	.2806	.2656	.2386	.2153	.1951	.1774	.1620	.1484	.1364	.1257	.1163	.1078
10	1	.3075	.2912	.2621	.2368	.2148	.1956	.1787	.1639	.1507	.1390	.1286	.1193
11	1	.3332	.3159	.2848	.2577	.2340	.2133	.1951	.1790	.1648	.1521	.1408	.1306
12	1	.3580	.3398	.3068	.2781	.2529	.2307	.2112	.1940	.1786	.1650	.1528	.1419
13	1	.3822	.3631	.3285	.2981	.2714	.2480	.2272	.2088	.1925	.1779	.1648	.1531
14	1	.4059	.3860	.3498	.3179	.2894	.2651	.2431	.2236	.2063	.1908	.1769	.1644
15	1	.4291	.4084	.3708	.3375	.3082	.2821	.2590	.2385	.2201	.2037	.1890	.1757
16	1	.4518	.4305	.3916	.3570	.3263	.2991	.2749	.2533	.2340	.2167	.2011	.1871
17	1	.4741	.4523	.4121	.3763	.3445	.3161	.2908	.2682	.2479	.2298	.2134	.1987
18	1	.4960	.4736	.4324	.3955	.3625	.3330	.3067	.2831	.2619	.2429	.2258	.2103
19	1	.5175	.4946	.4524	.4145	.3804	.3499	.3226	.2981	.2760	.2561	.2382	.2220
20	1	.5385	.5153	.4722	.4333	.3983	.3668	.3385	.3130	.2901	.2694	.2507	.2338
21	1	.5591	.5355	.4917	.4519	.4160	.3836	.3544	.3280	.3043	.2828	.2633	.2457
22	1	.5792	.5554	.5109	.4704	.4336	.4003	.3702	.3431	.3185	.2962	.2760	.2577
23	1	.5988	.5748	.5298	.4886	.4510	.4170	.3861	.3581	.3327	.3097	.2888	.2697
24	1	.6179	.5938	.5484	.5066	.4683	.4335	.4018	.3731	.3469	.3232	.3016	.2819
25	1	.6365	.6123	.5660	.5243	.4855	.4499	.4176	.3880	.3612	.3367	.3144	.2941
26	1	.6546	.6304	.5845	.5418	.5024	.4662	.4332	.4030	.3754	.3503	.3273	.3063
27	1	.6721	.6480	.6020	.5589	.5191	.4824	.4487	.4179	.3896	.3638	.3402	.3186
28	1	.6891	.6651	.6191	.5758	.5356	.4984	.4641	.4327	.4038	.3774	.3532	.3310
29	1	.7055	.6817	.6358	.5924	.5518	.5142	.4794	.4474	.4180	.3909	.3661	.3433
30	1	.7214	.6978	.6521	.6086	.5678	.5298	.4945	.4621	.4321	.4045	.3791	.3557
31	1	.7365	.7123	.6660	.6223	.5815	.5435	.5082	.4757	.4457	.4181	.3927	.3693
32	1	.7515	.7285	.6834	.6401	.5990	.5605	.5245	.4910	.4600	.4314	.4049	.3805
33	1	.7673	.7441	.6991	.6558	.6147	.5762	.5402	.5067	.4757	.4461	.4186	.3932
34	1	.7824	.7596	.7147	.6714	.6293	.5896	.5523	.5174	.4850	.4541	.4256	.4002
35	1	.7975	.7747	.7298	.6865	.6445	.6038	.5645	.5276	.4931	.4611	.4316	.4052
36	1	.8126	.7898	.7449	.7016	.6596	.6189	.5796	.5427	.5082	.4752	.4447	.4183
37	1	.8277	.8049	.7599	.7166	.6746	.6339	.5946	.5577	.5232	.4902	.4597	.4333
38	1	.8428	.8199	.7749	.7316	.6896	.6489	.6096	.5727	.5382	.5052	.4747	.4483
39	1	.8579	.8350	.7899	.7466	.7046	.6639	.6246	.5877	.5532	.5202	.4897	.4633
40	1	.8730	.8501	.8050	.7617	.7197	.6790	.6397	.6028	.5683	.5353	.5048	.4784
41	1	.8881	.8652	.8201	.7768	.7348	.6939	.6546	.6177	.5832	.5502	.5197	.4933
42	1	.9032	.8803	.8352	.7919	.7499	.7090	.6697	.6328	.5983	.5653	.5348	.5084
43	1	.9183	.8954	.8503	.8070	.7650	.7241	.6848	.6479	.6134	.5804	.5499	.5235
44	1	.9334	.9105	.8654	.8221	.7801	.7392	.6999	.6630	.6285	.5955	.5650	.5386
45	1	.9485	.9256	.8805	.8372	.7952	.7543	.7149	.6780	.6435	.6105	.5800	.5536
46	1	.9636	.9407	.8956	.8523	.8103	.7694	.7301	.6932	.6587	.6257	.5952	.5688
47	1	.9787	.9558	.9107	.8674	.8254	.7845	.7452	.7083	.6738	.6408	.6103	.5839
48	1	.9938	.9709	.9258	.8825	.8405	.7996	.7603	.7234	.6889	.6559	.6254	.5990
49	1	.0089	.0060	.0010	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000



R I	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
1	.0299	.0273	.0250	.0230	.0211	.0195	.0180	.0167	.0155	.0144	.0134	.0126	.0118	.0110
2	.1101	.1007	.0924	.0849	.0781	.0721	.0667	.0619	.0575	.0535	.0500	.0467	.0437	.0410
3	.2180	.1999	.1837	.1691	.1559	.1441	.1335	.1239	.1153	.1074	.1003	.0938	.0879	.0826
4	.3300	.3036	.2797	.2581	.2386	.2209	.2050	.1906	.1775	.1656	.1548	.1449	.1359	.1277
5	.4309	.3979	.3678	.3404	.3154	.2928	.2722	.2535	.2364	.2209	.2068	.1938	.1820	.1711
6	.5152	.4778	.4432	.4115	.3824	.3559	.3316	.3094	.2891	.2705	.2536	.2380	.2237	.2106
7	.5839	.5438	.5064	.4718	.4398	.4103	.3832	.3583	.3354	.3144	.2951	.2773	.2610	.2460
8	.6401	.5988	.5598	.5233	.4892	.4577	.4284	.4014	.3765	.3535	.3324	.3128	.2947	.2781
9	.6870	.6454	.6057	.5681	.5328	.4997	.4689	.4403	.4138	.3892	.3664	.3454	.3259	.3078
1.0	.7269	.6858	.6460	.6080	.5718	.5378	.5059	.4760	.4482	.4223	.3982	.3758	.3551	.3358
1.1	.7615	.7213	.6820	.6439	.6074	.5727	.5400	.5092	.4804	.4534	.4282	.4048	.3829	.3625
1.2	.7917	.7529	.7143	.6766	.6401	.6052	.5719	.5405	.5108	.4830	.4569	.4325	.4096	.3883
1.3	.8184	.7812	.7437	.7066	.6704	.6354	.6019	.5700	.5398	.5113	.4844	.4592	.4355	.4133
1.4	.8419	.8065	.7704	.7342	.6985	.6638	.6303	.5981	.5675	.5384	.5109	.4850	.4606	.4376
1.5	.8628	.8294	.7947	.7597	.7248	.6904	.6571	.6249	.5940	.5646	.5366	.5101	.4851	.4614
1.6	.8812	.8499	.8169	.7832	.7492	.7154	.6824	.6503	.6194	.5897	.5614	.5344	.5089	.4847
1.7	.8975	.8683	.8371	.8048	.7719	.7389	.7064	.6745	.6437	.6139	.5853	.5581	.5321	.5074
1.8	.9118	.8848	.8555	.8247	.7930	.7609	.7290	.6976	.6669	.6372	.6085	.5810	.5547	.5297
1.9	.9244	.8995	.8721	.8429	.8125	.7815	.7504	.7195	.6891	.6595	.6309	.6032	.5767	.5514
2.0	.9355	.9127	.8872	.8596	.8306	.8008	.7705	.7402	.7103	.6810	.6524	.6248	.5981	.5725
2.1	.9451	.9243	.9007	.8749	.8473	.8187	.7894	.7599	.7305	.7015	.6732	.6456	.6189	.5932
2.2	.9535	.9346	.9129	.8888	.8627	.8354	.8071	.7785	.7497	.7212	.6931	.6657	.6390	.6132
2.3	.9607	.9438	.9238	.9014	.8769	.8508	.8237	.7964	.7699	.7400	.7123	.6851	.6585	.6327
2.4	.9669	.9518	.9336	.9128	.8898	.8652	.8392	.8124	.7852	.7578	.7306	.7037	.6774	.6517
2.5	.9723	.9588	.9423	.9231	.9017	.8784	.8536	.8279	.8015	.7748	.7481	.7216	.6955	.6700
2.6	.9769	.9649	.9500	.9324	.9125	.8905	.8670	.8424	.8169	.7910	.7649	.7388	.7131	.6877
2.7	.9808	.9702	.9568	.9407	.9223	.9017	.8795	.8559	.8314	.8063	.7808	.7553	.7299	.7049
2.8	.9841	.9748	.9628	.9482	.9311	.9119	.8910	.8685	.8450	.8207	.7960	.7711	.7461	.7214
2.9	.9869	.9787	.9680	.9548	.9391	.9213	.9016	.8803	.8578	.8344	.8104	.7861	.7616	.7373
3.0	.9892	.9821	.9726	.9607	.9464	.9298	.9113	.8912	.8697	.8473	.8241	.8004	.7765	.7526
3.2	.9928	.9875	.9802	.9705	.9586	.9446	.9285	.9106	.8913	.8707	.8492	.8269	.8043	.7814
3.4	.9953	.9914	.9858	.9782	.9684	.9566	.9428	.9272	.9099	.8912	.8715	.8508	.8295	.8077
3.6	.9970	.9942	.9899	.9840	.9762	.9664	.9547	.9411	.9259	.9091	.8911	.8721	.8522	.8317
3.8	.9981	.9961	.9930	.9884	.9822	.9742	.9644	.9527	.9394	.9246	.9083	.8910	.8726	.8535
4.0	.9988	.9974	.9952	.9917	.9868	.9804	.9722	.9624	.9509	.9378	.9233	.9076	.8907	.8730
4.2	.9993	.9983	.9967	.9941	.9904	.9852	.9785	.9703	.9604	.9490	.9362	.9221	.9068	.8905
4.4	.9996	.9989	.9978	.9959	.9930	.9889	.9835	.9767	.9684	.9585	.9473	.9347	.9209	.9060
4.6	.9997	.9993	.9985	.9972	.9950	.9918	.9875	.9819	.9749	.9665	.9567	.9456	.9332	.9197
4.8	.9998	.9996	.9990	.9981	.9964	.9940	.9906	.9860	.9802	.9731	.9646	.9549	.9439	.9318
5.0	.9999	.9997	.9994	.9987	.9975	.9957	.9930	.9893	.9845	.9785	.9713	.9628	.9532	.9423

A(R,T,N) = PROB(AT LEAST ONE HIT) FOR N = 20

R	T	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
1	1	.0104	.0098	.0087	.0078	.0070	.0063	.0057	.0052	.0048	.0044	.0041	.0038
2	1	.0386	.0363	.0323	.0289	.0261	.0236	.0214	.0195	.0179	.0164	.0152	.0140
3	1	.0776	.0731	.0651	.0584	.0526	.0476	.0433	.0395	.0362	.0332	.0307	.0284
4	1	.1202	.1133	.1010	.0906	.0817	.0740	.0673	.0614	.0563	.0518	.0478	.0442
5	1	.1612	.1520	.1358	.1219	.1100	.0997	.0907	.0829	.0760	.0699	.0645	.0597
6	1	.1985	.1874	.1676	.1507	.1361	.1235	.1125	.1028	.0943	.0868	.0802	.0742
7	1	.2321	.2193	.1965	.1769	.1599	.1452	.1324	.1211	.1112	.1024	.0946	.0876
8	1	.2627	.2484	.2229	.2010	.1819	.1654	.1509	.1381	.1269	.1170	.1081	.1002
9	1	.2910	.2755	.2476	.2236	.2026	.1844	.1684	.1543	.1418	.1308	.1210	.1122
10	1	.3178	.3011	.2712	.2452	.2225	.2026	.1852	.1699	.1563	.1442	.1334	.1238
11	1	.3435	.3258	.2939	.2661	.2418	.2204	.2017	.1851	.1704	.1573	.1457	.1352
12	1	.3683	.3497	.3160	.2865	.2607	.2379	.2179	.2002	.1844	.1704	.1578	.1465
13	1	.3925	.3730	.3376	.3066	.2793	.2552	.2340	.2151	.1983	.1833	.1699	.1579
14	1	.4161	.3958	.3589	.3265	.2978	.2724	.2500	.2300	.2122	.1963	.1820	.1692
15	1	.4392	.4182	.3800	.3461	.3161	.2896	.2659	.2449	.2261	.2093	.1942	.1807
16	1	.4619	.4403	.4007	.3656	.3344	.3066	.2819	.2598	.2401	.2224	.2065	.1922
17	1	.4841	.4619	.4212	.3849	.3525	.3236	.2979	.2748	.2541	.2356	.2188	.2038
18	1	.5058	.4832	.4415	.4041	.3706	.3406	.3138	.2898	.2682	.2488	.2313	.2155
19	1	.5272	.5041	.4614	.4230	.3885	.3576	.3298	.3048	.2823	.2621	.2438	.2272
20	1	.5480	.5247	.4812	.4418	.4064	.3744	.3457	.3198	.2965	.2754	.2564	.2391
21	1	.5685	.5448	.5006	.4604	.4241	.3912	.3616	.3349	.3107	.2889	.2691	.2511
22	1	.5884	.5645	.5197	.4788	.4416	.4080	.3775	.3499	.3249	.3023	.2818	.2631
23	1	.6078	.5837	.5385	.4969	.4590	.4246	.3933	.3650	.3392	.3158	.2946	.2753
24	1	.6267	.6026	.5569	.5148	.4763	.4411	.4091	.3800	.3535	.3294	.3074	.2874
25	1	.6451	.6209	.5750	.5325	.4933	.4575	.4248	.3949	.3677	.3429	.3203	.2997
26	1	.6629	.6388	.5927	.5498	.5102	.4738	.4404	.4099	.3820	.3565	.3333	.3120
27	1	.6802	.6562	.6101	.5669	.5268	.4899	.4559	.4247	.3962	.3701	.3462	.3243
28	1	.6970	.6731	.6270	.5837	.5432	.5058	.4713	.4395	.4104	.3837	.3592	.3367
29	1	.7132	.6895	.6436	.6001	.5594	.5216	.4865	.4543	.4245	.3972	.3721	.3491
30	1	.7288	.7054	.6597	.6162	.5753	.5371	.5017	.4689	.4386	.4107	.3851	.3615
31	1	.7584	.7355	.6906	.6474	.6063	.5676	.5314	.4977	.4665	.4376	.4109	.3863
32	1	.7857	.7637	.7198	.6771	.6361	.5971	.5604	.5261	.4941	.4643	.4366	.4110
33	1	.8108	.7897	.7472	.7053	.6646	.6256	.5887	.5538	.5211	.4906	.4621	.4357
34	1	.8337	.8136	.7727	.7319	.6918	.6531	.6160	.5809	.5477	.5165	.4874	.4601
35	1	.8545	.8355	.7965	.7569	.7177	.6794	.6424	.6071	.5736	.5424	.5122	.4843
36	1	.8733	.8555	.8184	.7803	.7421	.7044	.6678	.6325	.5989	.5669	.5367	.5082
37	1	.8902	.8736	.8386	.8022	.7652	.7283	.6921	.6571	.6234	.5912	.5609	.5317
38	1	.9052	.8899	.8571	.8224	.7868	.7509	.7154	.6807	.6471	.6148	.5840	.5548
39	1	.9186	.9045	.8740	.8412	.8070	.7722	.7375	.7033	.6700	.6378	.6069	.5774
40	1	.9304	.9175	.8892	.8584	.8258	.7923	.7585	.7250	.6921	.6600	.6291	.5995

APPENDIX B

AKP Program Listing

# INPUT INSTRUCTIONS

<u>Card</u>	<u>Column</u>	<u>Input Description</u>	<u>Format</u>
1	1- 5	NR, Number of a's (10 max)	I5
	6-10	NSIG1, Number of $\sigma_1$ 's (10 max)	I5
	11-15	NSIG2, Number of $\sigma_2$ 's (10 max)	I5
	16-20	NN, Number of N's (10 max)	I5
	21-25	NMAX, Maximum number of intervals for numerical integration	I5
	26-30	c (as defined on page 7)	I5
	31-40	TOL, Integration Tolerance	E10.5
2	1- 5	First target radius	F5.0
	6-10	Second target radius	F5.0
	etc.		
3	1- 5	First $\sigma_1$	F5.0
	6-10	Second $\sigma_1$	F5.0
	etc.		
4	1- 5	First $\sigma_2$	F5.0
	6-10	Second $\sigma_2$	F5.0
5	1- 5	First N	I5
	6-10	Second N	I5
	etc.		



```

*****

```

PROGRAM AKP CDC 6600 FTN V3.0-P268 OPT=1 10/13/71 14.38.19. PAGE 1

```

      PROGRAM AKP(INPUT,OUTPUT,TAPE1=INPUT)
      DIMENSION R(10), SIG1(10), SIG2(10), N(10)
      C READ IN NO. OF P, SIGMA 1, SIGMA 2, NN, NMAX, C, TOL
      READ 12, NR, NSIG1, NSIG2, NN, NMAX, IC, TOL
      12 FORMAT (6I5, E10.5)
      PRINT 15, NR, NMAX, NSIG1, IC, NSIG2, TOL, NN
      15 FORMAT(1H1,/,/4X,35HAXISYMMETRIC KILL PROBABILITY (AKP),/,/,
      1 34X,8HNR = ,15,34X,7HNMAX = ,15,
      2//,34X,8HNSIG1 = ,15,34X,7HIC = ,15,
      3//,34X,8HNSIG2 = ,15,34X,7HTOL = ,E12.5,/,34X,9HNN ,15,/)
      C
      C READ R VALUES
      READ 20, (R(I), I=1, NR)
      20 FORMAT (16F5.0)
      PRINT 25, (R(I), I=1, NR)
      25 FORMAT (1H-, 4X, 8HR VALUES/ 12(5X, F6.2))
      C READ SIGMA 1 VALUES
      READ 30, (SIG1(I), I=1, NSIG1)
      30 FORMAT (16F5.0)
      PRINT 35, (SIG1(I), I=1, NSIG1)
      35 FORMAT (1H-, 4X, 13HSIGMA1 VALUES/ 12(5X, F6.2))
      C
      C READ SIGMA 2 VALUES
      READ 40, (SIG2(I), I=1, NSIG2)
      40 FORMAT (16F5.0)
      PRINT 45, (SIG2(I), I=1, NSIG2)
      45 FORMAT (1H-, 4X, 13HSIGMA2 VALUES/ 12(5X, F6.2))
      C READ N VALUES
      READ 50, (N(I), I=1, NN)
      50 FORMAT (16I5)
      PRINT 55, (N(I), I=1, NN)
      55 FORMAT (1H-, 4X, 8HN VALUES/ 12(5X, I6))
      PIROOT = SQRT(2.*3.1415926536)
      A=0
      C LOOP FOR ALL R
      DO 500 I=1, NR
      C LOOP FOR ALL SIGMA 2
      DO 400 J=1, NSIG2
      C LOOP FOR ALL SIGMA 1
      DO 300 K=1, NSIG1
      PRS = PIROOT / SIG1(K)
      B = FLOAT(IC)*SIG1(K)
      PRINT 160, SIG1(K), SIG2(J), R(I)
      160 FORMAT(1H1,/,/4X,35HPROBABILITY OF AT LEAST ONE HIT FOR 1H-,54X,
      116HSIGMA1 = ,F6.2/1H0,54X,16HSIGMA2
      216HTARGET RADIUS = ,F6.2)
      C COMPUTE AKP1
      SIGSQ = SIG1(K)**2 + SIG2(J)**2
      AKP1 = 1. - EXP(-R(I)**2 / (2.*SIGSQ))
      PRINT 170, AKP1
      170 FORMAT(31H-FOR N = 1, EXACT PROBABILITY =,F10.9/1H-,29X,10HSALVO S
      11ZE,20X,11HPROBABILITY,20X,9HINTERVALS)
      C LOOP FOR ALL N VALUES
      DO 200 L=1, NN
      NITER=4

```

```
C
C  COMPUTE AKP
S2=-10.
S3=-10.
H = (B-A) / FLOAT(NITER)
FAB = FCT(SIG1(K), SIG2(J), R(I), A, N(L), PIROOT) +
1  FCT(SIG1(K), SIG2(J), R(I), B, N(L), PIROOT)
ND2M1 = NITER/2 - 1
SUM2 = 0.
X=A
DELTA = H + H
DO 110 M=1,ND2M1
X = X + DELTA
SUM2 = SUM2 + FCT(SIG1(K), SIG2(J), R(I), X, N(L), PIROOT)
110 CONTINUE
120 ND2 = NITER/2
SUM4 = 0
X = A-H
DELTA = H + H
DO 130 M=1,ND2
X = X + DELTA
SUM4 = SUM4 + FCT(SIG1(K), SIG2(J), R(I), X, N(L), PIROOT)
130 CONTINUE
S1 = (H/3.) * (FAB + 4.*SUM4 + 2.*SUM2)
IF (ABS(S1-S2) .GT. TOL) GO TO 140
IF (ABS(S1-S3) .GT. TOL) GO TO 140
IF (ABS(S2-S3) .LT. TOL) GO TO 150
140 IF (NITER .GE. NMAX) GO TO 150
S3=S2
S2=S1
NITER = 2*NITER
H = (B-A) / FLOAT(NITER)
SUM2 = SUM4 + SUM2
GO TO 120
150 AKPP=1.-(PRS*S1)
PRINT 180, N(L), AKP, NITER
180 FORMAT(1H, 32X,I5,19X,F12.8,23X,I5)
200 CONTINUE
300 CONTINUE
400 CONTINUE
500 CONTINUE
Y=SECOND(A)
1005 FORMAT(20H1 RUNNING TIME WAS ,F12.4,8H SECONDS)
PRINT 1005,Y
END
```

100

```
FUNCTION ERF(X)
  DIMENSION TERA(415), TERO(451)
  DATA (TERA(I), I=1,125) / 1., 13*, 99999999, 6*, 999999998,
1 5*, 99999997, 3*, 99999996, 2*, 99999995, 2*, 99999994,
2 2*, 99999993, 2*, 99999992, 99999991, 99999990, 2*, 99999989,
3 99999988, 99999987, 99999986, 99999985, 99999983,
4 99999982, 99999981, 99999979, 99999977, 99999976,
5 99999974, 99999972, 99999969, 99999967, 99999964,
6 99999962, 99999959, 99999956, 99999952, 99999948,
7 99999945, 99999940, 99999936, 99999931, 99999926,
8 99999920, 99999914, 99999908, 99999901, 99999893,
9 99999885, 99999877, 99999868, 99999858, 99999848,
10 99999837, 99999825, 99999812, 99999798, 99999784,
11 99999768, 99999751, 99999734, 99999715, 99999694,
12 99999672, 99999649, 99999624, 99999598, 99999570,
13 99999540, 99999507, 99999473, 99999436, 99999397,
14 99999356, 99999311, 99999264, 99999214, 99999160,
15 99999103, 99999042, 99998977, 99998908, 99998835,
16 99998757, 99998674, 99998586, 99998492, 99998392,
17 99998286, 99998173, 99998053, 99997926, 99997791,
18 99997647, 99997495, 99997333, 99997162, 99996980,
19 99996787, 99996582, 99996365, 99996134, 99995890 /
20 DATA (TERA(I), I=126,223) / 99995632, 99995358, 99995067,
21 99994760, 99994434, 99994090, 99993725, 99993339,
22 99992931, 99992499, 99992042, 99991559, 99991048,
23 99990508, 99989938, 99989335, 99988699, 99988026,
24 99987316, 99986567, 99985776, 99984941, 99984060,
25 99983131, 99982151, 99981118, 99980029, 99978881,
26 99977671, 99976397, 99975054, 99973640, 99972151,
27 99970584, 99968834, 99967198, 99965371, 99963450,
28 99961429, 99959305, 99957071, 99954724, 99952257,
29 99949665, 99946942, 99944083, 99941080, 99937928,
30 99934620, 99931149, 99927506, 99923686, 99919679,
31 99915478, 99911073, 99906457, 99901620, 99896551,
32 99891242, 99885682, 99879861, 99873766, 99867387,
33 99860712, 99853728, 99846423, 99838783, 99830795,
34 99822444, 99813715, 99804594, 99795065, 99785111,
35 99774715, 99763861, 99752529, 99740702, 99728361,
36 99715485, 99702053, 99688046, 99673441, 99658215,
37 99642346, 99625810, 99608581, 99590635, 99571945,
38 99552485, 99532227, 99511141, 99489200, 99466372,
39 99442628, 99417933, 99392257, 99365565, 99337823 /
40 DATA (TERA(I), I=224,321) / 99308994, 99279043, 99247932,
41 99215622, 99180075, 99147249, 99111103, 99073595,
42 99034681, 98994316, 98952454, 98909050, 98864055,
43 98817420, 98769094, 98719028, 98667167, 98613459,
44 98557850, 98500283, 98440701, 98379046, 98315259,
45 98249279, 98181044, 98110492, 98037559, 97962178,
46 97884284, 97803809, 97720684, 97634838, 97546202,
47 97454701, 97360263, 97262812, 97162273, 97058569,
48 96951621, 96841350, 96727675, 96610515, 96489786,
49 96365407, 96237290, 96105351, 95969503, 95829657,
50 95685725, 95537618, 95385244, 95228512, 95067330,
51 94901604, 94731240, 94555614, 94376220, 94191372,
52 94001503, 93806516, 93606312, 93400794, 93189863,
```

4 929733419, 92751363, 92523594, 92290013, 92050518,  
5 91005010, 91553388, 91295551, 91031398, 90760829,  
6 90483743, 90200040, 89909620, 89612384, 89308233,  
7 89397067, 89678789, 88353301, 88020507, 87680310,  
8 87332616, 86977330, 86614359, 86243611, 85864995,  
9 85478421, 85087330, 84681050, 84270079, 83850807,  
1 934233150, 82987029, 82542365, 82089081, 81627102 /  
DATA (TERA(I), I=322,415) / 81156356, 80676772, 80188283,  
1 79680821, 79184325, 78668732, 78143985, 77610027,  
2 77066806, 76514271, 75952376, 75381075, 74800328,  
3 74210096, 73610345, 73001043, 72382161, 71753675,  
4 71115563, 70467808, 69810394, 69143312, 68466555,  
5 67780119, 67084006, 66378220, 65662770, 64937669,  
6 64202933, 63458583, 62704644, 61941146, 61168122,  
7 60385609, 59593650, 58792290, 57981581, 57161576,  
8 56332337, 55493925, 54646410, 53789863, 52924362,  
9 52049988, 51166826, 50274967, 49374505, 48465539,  
1 47548172, 46622512, 45688669, 44746762, 43796909,  
2 42839236, 41873870, 40900945, 39920598, 38932970,  
3 37938205, 36936453, 35927865, 34912599, 33890815,  
4 32662676, 31828350, 30788007, 29741822, 28689972,  
5 27632639, 26570006, 25502260, 24429591, 23352192,  
6 22702259, 21183989, 20093584, 18999246, 17901181,  
7 16799597, 15694703, 14586711, 13475835, 12362290,  
8 11246292, 10128059, 090078126, 078857720, 067621594,  
9 056371978, 045111106, 033841222, 022564575, 011283416, 0 /  
DATA (TERD(I), I=1, 78) / 18113059E-08, 19816862E-08,  
1 21676596E-08, 23706118E-08, 25920474E-08, 28336002E-08,  
2 30970439E-08, 33843033E-08, 36974673E-08, 4038018E-08,  
3 44107647E-08, 48160210E-08, 52574603E-08, 57382144E-08,  
4 62616772E-08, 68315260E-08, 74517438E-08, 81266442E-08,  
5 88608977E-08, 96595598E-08, 10528102E-07, 11472445E-07,  
6 12498993E-07, 13614673E-07, 14826974E-07, 16143994E-07,  
7 17574484E-07, 19127901E-07, 20814463E-07, 22645204E-07,  
8 24632041E-07, 26787841E-07, 29126490E-07, 31662977E-07,  
9 34413471E-07, 37395414E-07, 40627618E-07, 44130364E-07,  
1 47825517E-07, 52036639E-07, 56489121E-07, 61310313E-07,  
2 66529674E-07, 72178923E-07, 78292207E-07, 84906281E-07,  
3 92060694E-07, 99797993E-07, 10816394E-06, 11720776E-06,  
4 12698235E-06, 13754458E-06, 14895557E-06, 16128098E-06,  
5 17459135E-06, 18896240E-06, 20447548E-06, 22121787E-06,  
6 2328327E-06, 25877218E-06, 27979245E-06, 30245971E-06,  
7 32689796E-06, 35324013E-06, 38162867E-06, 41221624E-06,  
8 4416637E-06, 48065419E-06, 51886725E-06, 56000632E-06,  
9 60428629E-06, 65193709E-06, 70320473E-06, 75835232E-06,  
1 81766120E-06, 88143219E-06, 94998679E-06, 10236686E-05 /  
DATA (TERD(I), I=79,156) / 11028445E-05, 11879068E-05,  
1 12792741E-05, 13773933E-05, 14827416E-05, 15958281E-05,  
2 17171961E-05, 18474250E-05, 19871328E-05, 21369782E-05,  
3 22976636E-05, 24699374E-05, 26545968E-05, 28524914E-05,  
4 30645257E-05, 32916626E-05, 35349275E-05, 37954113E-05,  
5 40742749E-05, 43727530E-05, 46921589E-05, 50338887E-05,  
6 53934268E-05, 57903503E-05, 62083353E-05, 66551620E-05,  
7 71327211E-05, 76430199E-05, 81881894E-05, 87704910E-05,  
8 93923243E-05, 10056235E-04, 10764921E-04, 11521246E-04,

115	9	12328243E-04,	13189127E-04,	14107306E-04,	15086387E-04,
	1	16130192E-04,	17242768E-04,	18428397E-04,	19691613E-04,
	2	21037210E-04,	22470263E-04,	23996135E-04,	25620500E-04,
	3	27349351E-04,	29189025E-04,	31146217E-04,	33227997E-04,
	4	35441831E-04,	37795604E-04,	40297636E-04,	42956707E-04,
	5	45782082E-04,	48783532E-04,	51971360E-04,	55356429E-04,
	6	58950187E-04,	62764699E-04,	66812674E-04,	71107499E-04,
	7	75663267E-04,	80494817E-04,	85617765E-04,	91048542E-04,
	8	96804434E-04,	10290362E-03,	10936521E-03,	11620929E-03,
120	9	12345698E-03,	13113047E-03,	13925305E-03,	14784919E-03,
	1	15694459E-03,	16656619E-03,	17674231E-03,	18750262E-03,
		DATA (TERD(I), I=157,234) / .19887824E-03, .21090184E-03,			
	1	22360761E-03,	23703144E-03,	25121089E-03,	26618533E-03,
	2	28199597E-03,	29868598E-03,	31630053E-03,	33488688E-03,
125	3	35449449E-03,	37517508E-03,	39698274E-03,	41997400E-03,
	4	44420794E-03,	46974632E-03,	49665360E-03,	52499713E-03,
	5	55484722E-03,	58627725E-03,	61936378E-03,	65418671E-03,
	6	69082932E-03,	72937850E-03,	76992476E-03,	81256247E-03,
	7	85738992E-03,	90450949E-03,	95402778E-03,	10060958E-02,
130	8	10607090E-02,	11181075E-02,	11783764E-02,	12416455E-02,
	9	13080500E-02,	13777304E-02,	14508325E-02,	15275078E-02,
	1	16079137E-02,	16922136E-02,	17805771E-02,	18731800E-02,
	2	19702048E-02,	20718409E-02,	21782842E-02,	22897383E-02,
135	3	24064136E-02,	25285285E-02,	26563089E-02,	27899886E-02,
	4	29298098E-02,	30760230E-02,	3228871E-02,	33886700E-02,
	5	35556487E-02,	37301032E-02,	39123473E-02,	41026681E-02,
	6	43013869E-02,	45088292E-02,	47253306E-02,	49512374E-02,
	7	51869067E-02,	54327069E-02,	56890172E-02,	59562287E-02,
140	8	62347440E-02,	65249776E-02,	68273562E-02,	71423390E-02,
	9	74703176E-02,	78118164E-02,	81672930E-02,	85372378E-02,
	1	89221551E-02,	93225623E-02,	97389910E-02,	10171986E-01,
		DATA (TERD(I), I=235,312) / .10622108E-01, .11089930E-01,			
	1	11576041E-01,	12081043E-01,	12605554E-01,	13150207E-01,
	2	13715650E-01,	14302545E-01,	14911571E-01,	15543422E-01,
145	3	16158806E-01,	16878448E-01,	17583088E-01,	18313482E-01,
	4	19070402E-01,	19854636E-01,	20666985E-01,	21508270E-01,
	5	22379324E-01,	23280999E-01,	24214158E-01,	25179685E-01,
	6	26178475E-01,	27211441E-01,	28279510E-01,	29383624E-01,
	7	30524740E-01,	31703831E-01,	32921801E-01,	34179892E-01,
	8	35478877E-01,	36819865E-01,	38203897E-01,	39632026E-01,
150	9	41105318E-01,	42624854E-01,	44191723E-01,	45807027E-01,
	1	47471879E-01,	49187401E-01,	50954726E-01,	52774996E-01,
	2	54649361E-01,	56578979E-01,	58565016E-01,	60608644E-01,
	3	62711040E-01,	64873390E-01,	67096878E-01,	69382697E-01,
155	4	71732040E-01,	74146103E-01,	76626082E-01,	79173173E-01,
	5	81788571E-01,	84473470E-01,	87229059E-01,	90056524E-01,
	6	92957046E-01,	95931799E-01,	98981951E-01,	10210866E+00,
	7	10531307E+00,	10859632E+00,	11195954E+00,	11540383E+00,
	8	11893029E+00,	12254000E+00,	12623402E+00,	13001340E+00,
160	9	13387915E+00,	13783227E+00,	14187374E+00,	14600451E+00,
	1	15022550E+00,	15453761E+00,	1589471E+00,	16343862E+00,
		DATA (TERD(I), I=313,390) / .16802916E+00, .17271408E+00,			
	1	17749413E+00,	18236999E+00,	18734232E+00,	19241173E+00,
	2	19757880E+00,	20284406E+00,	20820799E+00,	21367101E+00,
165	3	21923353E+00,	22489587E+00,	23065833E+00,	23652112E+00,

```

170  4 .24248443E+00, .24854838E+00, .25471302E+00, .26097837E+00,
5    5 .26734435E+00, .27381084E+00, .28037767E+00, .28704457E+00,
6    6 .29381124E+00, .30067728E+00, .30764223E+00, .31470557E+00,
7    7 .32186671E+00, .32912497E+00, .33647960E+00, .34392978E+00,
8    8 .35147462E+00, .35911315E+00, .36684430E+00, .37466696E+00,
9    9 .38257990E+00, .39058184E+00, .39867140E+00, .40684713E+00,
1   1 .41510750E+00, .42345088E+00, .43187557E+00, .44037979E+00,
2   2 .44896167E+00, .45761925E+00, .46635051E+00, .4751531E+00,
3   3 .48402546E+00, .49296467E+00, .50196857E+00, .51103471E+00,
4   4 .52016055E+00, .52934348E+00, .53858079E+00, .54786972E+00,
5   5 .55720740E+00, .56659089E+00, .57601720E+00, .58548322E+00,
6   6 .59498579E+00, .60452157E+00, .61408756E+00, .62368006E+00,
7   7 .63329574E+00, .64293107E+00, .65258247E+00, .66224628E+00,
8   8 .67191881E+00, .68159628E+00, .69127486E+00, .70095067E+00,
9   9 .71061978E+00, .72027819E+00, .72992188E+00, .73954676E+00,
1  1 .74914872E+00, .75872358E+00, .76826714E+00, .77777518E+00 /
    DATA (TERD(I), I=391,451) / .78724343E+00, .79666759E+00,
1  1 .90604334E+00, .81536635E+00, .82463224E+00, .83383665E+00,
2  2 .84297518E+00, .85204344E+00, .86103703E+00, .86995155E+00,
3  3 .87878258E+00, .88752973E+00, .89617662E+00, .90473087E+00,
4  4 .91318411E+00, .92153201E+00, .92977025E+00, .93789454E+00,
5  5 .94590063E+00, .95378427E+00, .96154130E+00, .96916756E+00,
6  6 .97665895E+00, .98401143E+00, .99122100E+00, .99828371E+00,
7  7 .10051957E+01, .10119531E+01, .10185522E+01, .10249894E+01,
8  8 .10312609E+01, .10373633E+01, .10432932E+01, .10490471E+01,
9  9 .10546218E+01, .10600141E+01, .10652209E+01, .10702393E+01,
1  1 .10750662E+01, .10796989E+01, .10841348E+01, .10883712E+01,
2  2 .10924056E+01, .10962357E+01, .10998593E+01, .11032741E+01,
3  3 .11064783E+01, .11094698E+01, .11122469E+01, .11148081E+01,
4  4 .11171516E+01, .11192762E+01, .11211806E+01, .11228636E+01,
5  5 .11243243E+01, .11255617E+01, .11265752E+01, .11273641E+01,
6  6 .11279279E+01, .11282663E+01, .11283792E+01 /
    ERF = 1.
    ARGMX = 4.14
    GO TO 10
    ENTRY ERFD
    ERF = 0.
    ARGMX = 4.5
    V = ABS(X)
    SIGN = 1.
    IF(X.LT.0.) SIGN = -1.
    IF (ARGMX.LE. V) RETURN
    L = 100.*V + .5
    X1 = .01*FLOAT(L)
    DX = V-X1
    J = 451-L
    IF (ERF) 20, 30, 20
20  ERF = (TERA(J-36) + TERD(J)*DX*(1.-DX*X1))*SIGN
    RETURN
30  ERF = (TERD(J) * (1. - DX*(DX + 2.*X1*(1.-DX*X1) ) ))*SIGN
    RETURN
    END

```

## SUBROUTINE CIRCV

CDC 6600 FTN V3.0-P268 OPT=1 10/13/71 14.38.19.

PAGE 1

SUBROUTINE CIRCV (RK, DC, KR, PV, IR)

IR = 0

IF (RK) 10, 20, 30

10 IR = 7

15 PV = -1.

RETURN

20 PV = 0.

RETURN

40 IR = 5

GO TO 15

100 PV = 1.

RETURN

C

30 A = RK

B = ABS(DC)

C = 0.

IF (KR) 40, 220, 50

C

50 WLOC = A-B

IF (WLOC + 6.1094103) 20, 20, 90

90 IF (WLOC - 6.5446793) 110, 100, 100

110 BA = A\*B

KFLAG = 0

X = SIGN(1., WLOC)

IF (BA - 11.) 120, 120, 240

C

220 IF (A - 6.5446793) 222, 100, 100

222 IF (B) 290, 290, 224

224 OFF = A\*A

SA = B\*B

230 OFF = A/B\*.5

A = (1.-B)\*OFF

B = (1.+B)\*OFF

KFLAG = -1

BA = A\*B

WLOC = A-B

C

120 S = ERFD(.70710678\*A)\*ERFD(.70710678\*B)

DE = A\*A + B\*B

DD = (2./DE\*BA)\*\*2

Q = ABS(WLOC\*(A+B)/DE)

Z0 = .78539816\*S

W0 = Q-Q\*Z0

Z2NM2 = Z0

W2NM2 = W0

SIGB = 0.

IF (KFLAG) 130, 160, 160

C

130 C = C+1.

IF (C-1000.) 140, 150, 150

140 Z2NM2 = (.5/C\*BA)\*\*2 + Z2NM2

OFF = DD\*W2NM2

W2NM2 = (OFF - .5/C\*OFF) - (4./DE\*C + 1.) \*Z2NM2\*Q

SIGB = W2NM2+SIGB

55

50

45

40

35

30

25

20

15

10

5

```

150 IF (ABS(W2NM2) - .0000005) 150, 150, 130
151 PV = W0 + SIGB
152 RETURN
C
160 SIGA = 0.
170 C = C+1.
180 IF (C-1000.) 180, 200, 200
181 Z2NM2 = (BA/C*.5)**2 * Z2NM2
182 SIGA = Z2NM2+SIGA
183 OFF = DD*W2NM2
184 W2NM2 = (OFF - .5/C*OFF) - (.4./DE*C + 1.) * Z2NM2*Q
185 SIGB = W2NM2 + SIGB
186 IF (ABS(W2NM2) - .0000005) 190, 190, 170
190 IF (ABS(Z2NM2) - .0000005) 200, 200, 170
200 OFF = 1.-Z0-SIGA
201 PV = (W0 + SIGB)*X + OFF)*.5
202 RETURN
C
240 OFF = ABS(.70710678*WLOC)
241 SA = ERFD(OFF)
242 SB = -ERF(OFF) + 1.
243 S = 4.*BA
244 SIGA = SQRT(2.*BA)
245 W2NM2 = .25/SIGA
246 Q = (A+B)/SIGA *SB*.70710678
247 SIGB = Q
248 DE = ABS((A+B)/S*WLOC)*SA
249 DD = WLOC/S*WLOC
250 Z0 = BA/SA*.000002
251 C = C+1.
252 IF (C-1000.) 260, 280, 280
260 WLOC = Q*DD
261 Q = DE*W2NM2 + .5/C*WLOC - WLOC
262 SIGB = Q + SIGB
263 Z2NM2 = (C*2. - 1.)*W2NM2
264 SIGA = Z2NM2 + SIGA
265 W2NM2 = (.5+C)/(1.+C)*Z2NM2/S
266 IF (ABS(Q) - .0000005) 270, 270, 250
270 IF (ABS(Z2NM2) - .0000005) 280, 280, 250
280 PV = ((1.-SIGB)*X - SA/S*SIGA + 1.) * .5
281 RETURN
C
290 OFF = .70710678*A
291 SA = ERFD(OFF)
292 SB = 1.-ERF(OFF)
293 OFF = 1.-B*B
294 WLOC = SQRT(OFF)
295 W2NM2 = .35355339/A*B/WLOC
296 Q = SB/WLOC
297 SIGB = Q
298 SA = SA*B/OFF
299 SB = B*B/OFF
300 OFF = S9/A**2
301 C = C+1.
302 IF (C-1000.) 310, 320, 320
```



SUBROUTINE CIRCV

CDC 6600 FTN V3.0-P268 OPT=1 10/13/71 14.38.19.

PAGE 3

```
310 WLOC = Q*SB
    Q = SA*W2NM2 + WLOC*.5/C - WLOC
    SIGR = Q*SIGR
    W2NM2 = (2.*C-1.)*W2NM2*OFF*(C+.5) / (C+1.)
    IF (ABS(Q) - .0000005) 320, 320, 300
320 PV = 1.-SIGR
    RETURN
    END
```

115

FUNCTION FCT

FUNCTION FCT (S1, S2, R, X, N, P)  
V1 = R/S2  
V2 = X/S2  
CALL CIRCV (V1, V2, 1, PROB, IDUMMO)  
FCT = (1. - PROB)\*\*N / (P\*S1) \* EXP(-X\*\*2 / (2.\*S1\*\*2)) \* X  
RETURN  
END

CDC 6600 FTN V3.0-P268 OPT=1 10/13/71 14.38.19.

PAGE

1



# Sample Output

## AXISYMMETRIC KILL PROBABILITY (AKP)

NR	=	2	NMAX	=	2048
NSIG1	=	2	IC	=	5
NSIG2	=	1	TOL	=	.10000E-04
NN		5			

R VALUES  
1.50      2.50

SIGMA1 VALUES  
2.10      4.30

SIGMA2 VALUES  
1.00

N VALUES	1	2	3	4	5
----------	---	---	---	---	---

# Sample Output

PROBABILITY OF AT LEAST ONE HIT FOR

SIGMA1 = 2.10

SIGMA2 = 1.00

TARGET RADIUS = 1.50

FOR N = 1, EXACT PROBABILITY = .18775093

SALVO SIZE  
1  
2  
3  
4  
5

PROBABILITY  
.18775466  
.30013671  
.37349987  
.42507892  
.46356893

INTERVALS  
256  
128  
128  
128  
128

# Sample Output

PROBABILITY OF AT LEAST ONE HIT FOR

SIGMA1 = 2.10  
SIGMA2 = 1.00  
TARGET RADIUS = 2.50

FOR N = 1, EXACT PROBABILITY = .43877535

SALVO SIZE  
1  
2  
3  
4  
5

PROBABILITY  
.43877911  
.58237629  
.65320828  
.69653525  
.72637348

INTERVALS  
128  
128  
128  
128  
128

# Sample Output

PROBABILITY OF AT LEAST ONE HIT FOR

SIGMA1 = 4.30  
 SIGMA2 = 1.00  
 TARGET RADIUS = 1.50

FOR N = 1, EXACT PROBABILITY = .05608760

SALVO SIZE  
 1  
 2  
 3  
 4  
 5

PROBABILITY  
 .05609135  
 .09172991  
 .11641486  
 .13474963  
 .14911749

INTERVALS  
 256  
 256  
 256  
 256  
 256

# Sample Output

PROBABILITY OF AT LEAST ONE HIT FOR

SIGMA1 = 4.30  
SIGMA2 = 1.00  
TARGET RADIUS = 2.50

FOR N = 1, EXACT PROBABILITY = .14814473

SALVO SIZE  
1  
2  
3  
4  
5

PROBABILITY  
.14814847  
.20774680  
.24210433  
.26563498  
.28330525

INTERVALS  
256  
256  
256  
256  
256



APPENDIX C

Distribution

## DISTRIBUTION

Chief of Naval Operations  
Department of the Navy  
Washington, D. C. 20350

Attn: OP-62	1
OP-621	1
OP-96	1
OP-96C	1
OP-962	1
OP-963	1
OP-21	1
OP-212	1
OP-981	1
OP-982	1

Director of Defense Research and Engineering  
Washington, D. C. 20390

Attn: Weapons Systems Evaluation Group	2
Attn: Deputy, Director, Strategic Systems	1

Commander

Naval Ordnance Systems Command  
Washington, D. C. 20360

Attn: Mr. J. J. Bellaschi (ORD-03B)	1
ORD-05	1
ORD-9132	2
ORD-03	1
ORD-032	1
ORD-531	1

Commander

Naval Air Systems Command  
Washington, D. C. 20360

Attn: AIR-03	1
AIR-03D (Dr. R. Burington)	1
AIR-503	1
AIR-604	2

Director, Strategic Systems Projects  
Department of the Navy  
Washington, D. C. 20390

Attn: SP-114	2
SP-230	1
SP-270	1
SP-203	1
SP-205	

DISTRIBUTION (continued)

Director Naval Research Laboratory Washington, D. C. 20390 Attn: Technical Information Division (2600)	2
Director Naval Ship Research & Development Center Washington, D. C. 20034 Attn: Mr. G. H. Gleissner Attn: Technical Library	1 2
Commander National Military Command System Support Center Washington, D. C. 20301 Attn: Mr. Robert E. Harshbarger	2
Joint Strategic Target Planning Staff Offutt Air Force Base, Nebraska 68113 Attn: JL Attn: JP Attn: CINCLANTREP DSTP	1 1 1
Office of Naval Research Department of the Navy Washington, D. C. 20360	1
Office of Naval Research 219 S. Dearborn Street Chicago, Illinois 60604	
Commanding Officer Naval Ordnance Laboratory/White Oak Silver Spring, Maryland 20910 Attn: Mr. E. Kobee Attn: Mathematics Department Attn: Technical Library	1 1 2
Center for Naval Analysis 1401 Wilson Boulevard Arlington, Virginia 22209 Attn: OEG MCOAG NAVWAG SEG INS	2 2 2 2 2

DISTRIBUTION (continued)

Sandia Corporation Livermore Branch P. O. Box 969 Livermore, California 94551 Attn: Technical Library	1
Sandia Corporation Box 5800 Albuquerque, New Mexico 87115 Attn: Technical Library	1
Commanding Officer Picatinny Arsenal Dover, New Jersey 07801 Attn: SMUPA-DW6	1
Commanding Officer U. S. Army Aberdeen R&D Center Aberdeen, Maryland 21005 Attn: AMXRD-AT	2
Attn: Dr. Frank E. Grubbs	2
Commanding Officer U. S. Air Force Armament Laboratory Eglin Air Force Base, Florida 32542 Attn: AFATL (DYLW)	2
Defense Intelligence Agency Washington, D. C. 20330 Attn: DI-7B1	1
Commanding Officer Harry Diamond Laboratories Washington, D. C. 20438 Attn: Mr. Israel Rotkin	1
Commanding Officer Naval Weapons Center China Lake, California 93555 Attn: Technical Library	1
Attn: Code 4072	1
Rand Corporation 1700 Main Street Santa Monica, California 90406 Attn: Mr. R. Snow	1
Attn: Technical Library	1

DISTRIBUTION (continued)

Commanding Officer Operational Test and Evaluation Force Naval Air Station Norfolk, Virginia 23511	1
Weapon System Analysis Office Quantico Marine Corps Quantico, Virginia 22134	1
SAC Headquarters Operations Analysis Offutt Air Force Base, Nebraska 68113 Attn: Mr. David Thompson (Code NRN)	1
Applied Physics Laboratory The Johns Hopkins University 8621 Georgia Avenue Silver Spring, Maryland 20910 Attn: Document Library Attn: Mr. Richard Peery	1 1
Operations Research, Inc. 1400 Spring Street Silver Spring, Maryland 20910 Attn: Mr. Phillip E. Lantz	1
Air Force Weapons Laboratory Kirtland Air Force Base, New Mexico 87117	1
Los Alamos Scientific Laboratory P. O. Box 1633 Los Alamos, New Mexico 87544 Attn: Library	1
Commanding General White Sands Missile Range Las Cruces, New Mexico 88002 Attn: Technical Library	1
Systems Engineering Group Wright-Patterson Air Force Base, Ohio 45433	1
Defense Documentation Center Cameron Station Alexandria, Virginia 22314	2

# DISTRIBUTION (continued)

Superintendent U. S. Naval Postgraduate School Monterey, California 93940 Attn: Technical Library	1
Lockheed Missiles & Space Company 3251 Hanover Street Palo Alto, California 94304 Attn: Technical Information Center	1
Lockheed Missiles & Space Company 1111 Lockheed Way Sunnyvale, California 94088 Attn: Mr. Clifford Oates, Jr.	1
Superintendent U. S. Naval Academy Annapolis, Maryland 21402 Attn: Library	1
National Bureau of Standards Washington, D. C. 20234 Attn: Applied Mathematics Department	1
U. S. Army Mathematics Research Center University of Wisconsin Madison, Wisconsin 54306 Attn: Technical Library	1
Commanding Officer U. S. Army Research Office Durham, North Carolina 27706	1
<u>Local:</u>	
D, D-1, K, KR, KXD, KXD-1, KW, KW-1, KW-4, KG, KGD, KE, KB, KC, KCX, KCS, TA, TAQ, GXK, MAM	1 each
KCM	50
GAF	2
MAL	2
MAP	5
MAM	

## DOCUMENT CONTROL DATA - R &amp; D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
Naval Weapons Laboratory Dahlgren, Virginia 22448		UNCLASSIFIED	
3. REPORT TITLE		2b. GROUP	
SALVO KILL PROBABILITIES FOR CIRCULAR TARGETS - AXISYMMETRIC CASE			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Marlin A. Thomas			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1971			
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		NWL TR-2643	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT			
Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; November 1971. Other requests for this document must be referred to the Naval Weapons Laboratory, Dahlgren, Virginia 22448.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	

13. ABSTRACT

The kill probability resulting from the delivery of a salvo of weapons is not a straightforward calculation since the aiming error is likely to be common to all rounds in the salvo. In the absence of a computer program or a set of tables the analyst may have to resort to the binomial law  $1-(1-p)^N$ , where p, the "single shot kill probability" is computed on the assumption that both aiming error and round-to-round error vary with each round in the salvo. Use of the binomial law in the salvo case can introduce serious error.

As an aid in determining weapon requirements, comparing weapon systems effectiveness, etc., salvo kill probabilities against circular targets are tabulated for a wide variety of parametric values under the following assumptions: (1) one aims at the center of a target of radius a and fires a salvo of size N; (2) the error in the mean impact point of the salvo from the target center is governed by a circular normal density with variance  $\sigma_1^2$ ; (3) the mean impact point is common to all rounds in the salvo but varies from salvo to salvo; (4) the errors in the individual impact point of shots within a salvo from the mean impact point are independently governed by a circular normal density with variance  $\sigma_2^2$ ; (5) the two errors above, referred to as the aiming error and the round-to-round error, respectively, are independent. The salvo kill probability, i.e., the probability that at least one round in the salvo falls within the target, is computed as a function of  $R = a/\sigma_2$ ,  $T = \sigma_1/\sigma_2$ , and N for  $R = .1(.1)3.0(.2)5.0$ ,  $T = .1(.1)3.0(.2)5.0$  and  $N = 1(1)14(2)20$ . Various examples pertaining to the use of the tables are given.